INTRODUCTION

Learning & Development oversee the EOM. The EOM Process strategy is executed primarily through the Manuals and Procedures Group. Other resources critical to this process are trainers, procedure writers, subject matter experts, document administrators, and process/design engineers, and local business unit management.

The EOM GUIDEBOOK mirrors' 'Guidelines for Writing Effective Operating and Maintenance Procedures' created by the Center for Chemical Process Safety[1]. The EOM Guidebook is the single source reference for developing procedures and training material within Richmond Refinery.

1.1 Background on Electronic Operating Manual (EOM)

The Chevron U.S.A. Excellence in Refining Best Practices Team identified the need to upgrade and improve operating manuals throughout the refining system. Since numerous overlapping issues were involved, the committee sanctioned an "Overlap Team" to identify the best approach for future operating manuals. This led to a pilot project during the summer of 1993 to demonstrate an integrated prototype for operating procedures, process and equipment information, training, and electronic information systems compliant with the requirements of OSHA's Process Safety Management (PSM) Regulation 29 CFR 1910.119.

In 1993 the pilot project involved multi-site representation and direct participation by senior operators, training specialists, and PSM and management personnel, with critical support provided from many other groups. The pilot project, using data from the VRDS unit at the El Segundo Refinery, successfully demonstrated the viability of an "Electronic Operating Manual of the Future."

The following major objectives guided initial development efforts, and they continue to be valued very highly in producing future electronic operating manuals:

- Provide an electronic operating manual to ensure that everyone has access to the same information, and to make it easier to keep this information up-to-date for viewing by all who need it (sometimes referred to as evergreen operating manuals).
- Establish sufficient standards and guidelines to obtain high quality operating manuals with consistent content and formats throughout the Chevron U.S.A. refining system.
- Use standardized techniques, organizational strategies, and development tools which yield efficiencies and cost savings by being able to share newly developed operating manual information throughout the refining system.

[1] American Institute of Chemical Engineers©1996

- Provide ready operator access to the full body of information needed to perform their job, with emphasis on the goal of safe, incident free operation.
- Institute a user-friendly delivery system that operators will like and use.
- Meet OSHA PSM requirements.
- Provide a location where lessons learned from incidents, near misses, and quality improvement efforts can be readily incorporated into the very procedures used to operate the plants.
- Deliver a product that can be readily applied for training purposes as well as to support regular work needs by integrating human factors, procedures, process information, equipment information, and training in a logical and mutually supportive manner.

An important element of the resulting approach was to join together the operating manual effort with Chevron's job task analysis/training development effort. The analysis and development tools for these efforts were combined and streamlined to maximize quality and efficiency.

Chevron is continuing implementation of the electronic operating manuals at all refineries in an organized, phased approach. First generation manuals are complete and are shared with other refineries to afford efficiencies in developing second generation manuals throughout the refining system.

1.2 How to Use This Guidebook

This Guidebook describes an effective, standardized approach for developing electronic operating manuals, including procedures and job-specific training materials. The primary purpose of the Guidebook is to help the personnel assigned to this work effort. It is intended that this Guidebook will ensure manuals are created in a consistent style, with necessary content, and that these materials can be readily imported into the electronic manual.

The Guidebook is organized to provide an overview of the standard operating manual structure and the recommended development process, followed by in-depth information on how to create each part of the operating manual.

The following table presents the sections and appendices for the Guidebook:

Sections and Appendices

1.	INTRODUCTION	Provides a general description of the electronic operating manual, this Guidebook, and how to use it.
2.	OPERATING MANUAL CONTENT	Explains the operating manual organization and content, and gives insights on why certain material is needed and where the necessary information is found in existing manuals.
3.	DEVELOPMENT PROCESS OVERVIEW	Describes the development process for operating manuals, from planning through final review and approval. Shows how the JTA, procedures, and training are integrated.
4.	DETAILS FOR CONDUCTING JTA	Describes the analytical process known as Job Task Analysis (JTA) used to identify work that needs to be performed in order to develop procedures, identify training needs, and collect and organize information.
5.	DETAILS FOR DEVELOPING VOLUME I - PROCESS AND EQUIPMENT DESCRIPTION	Describes in detail how to create this seven-chapter volume of the operating manual. It explains and identifies the value of the descriptive writing style in this portion of the operating manual to incorporate human factors and achieve high quality.
6.	DETAILS FOR DEVELOPING VOLUME II - OPERATING PROCEDURES	Describes in detail how to create normal operating and alarm procedures that make up the second volume of the operating manual. Describes standards and explains how to create procedures based on human factors.
7.	DETAILS FOR DEVELOPING VOLUME III - EMERGENCY PROCEDURES	Describes in detail how to create emergency procedures that make up the third volume of the operating manual. Describes standards and explains how to create procedures based on human factors.

Sections and Appendices

8.	DETAILS FOR DEVELOPING VOLUME IV - TRAINING GUIDE	Describes in detail how to create the fourth volume of the operating manual, which presents the training plan for structured on-the-job training, and contains the associated training materials. Standard formats for job aids and how to develop them are also presented in this section. Describes standards and explains how to incorporate human factors into material.
9.	CONVERTING EXISTING & FIRST GENERATION MANUALS	Discusses the process for taking an existing (14-Tab) or first generation operating manual and converting it to the EOM or second-generation manual. Tips are provided to take advantage of efficiencies, and also to recognize where new work and detailed review are essential.
10.	TOOLS FOR MANAGING OPERATING MANUAL DEVELOPMENT EFFORTS	Provides tools that can be used by manual development teams to manage and track their development efforts, as well as report progress.

APPENDIX AA	OSHA/PSM/RMP/CalARP Compliance
APPENDIX BB	OE5CM – Electronic Manuals Management System(EMMS) *Refinery Wide Procedure Review Process*
APPENDIX A	Provides Recommended Action Verbs and their definitions, to achieve standardization and consistency particularly in the procedures.
APPENDIX B	Serves as a Punctuation Handbook to guide all technical writing efforts to achieve high quality and user-friendly materials.
APPENDIX C	Presents Proofreading Techniques to assist in communicating intended corrections on marked-up copies of operating manual materials during the review process.
APPENDIX D	Reviews Wordy Expressions and other loose writing to achieve standardization and consistency in procedures and narrative writing.
APPENDIX E	Descriptive Writing for Process Overivew reviews the process and technical writing rules to for writing narrative in Volume 1. It is based on human factor design.

APPENDIX F	Process Overview - Format & Examples describes chapter, section and document layout.
APPENDIX G	Writing Operating Procedures explains rules for writing step by step procedures and is based on human factor design.
APPENDIX H	Operating Procedure - Format and Examples describes the details steps, and document layout specialized to this document.
APPENDIX I	Writing Emergency Procedures explains rules for writing step by step emergency procedures and is based on emergency response and human factor design.
APPENDIX J	Emergency Procedure - Format and Examples describes the details steps, and document layout specialized to this document.
APPENDIX K	File Names and procedure Numbers explains the logic for naming documents, how the logic is applied to and used within the document library system.
APPENDIX M	Interview Techniques serves as a guide to conduct formal job task analysis interviews.
APPENDIX P	Procedures – Defining Our Terms explains definitions of procedures, job aids, checklists, etc.
APPENDIX Q	Latent Condition Procedure Checklist
APPENDIX R	Latent Conditions Procedure Review Process
APPENDIX S	Re-Categorized Procedures
APPENDIX T	RMPCT Controller Fundamentals
APPENDIX Y	Data Base Management – under development – briefly outlines current practice.
APPENDIX W	Web Page Layout

This Guidebook is written using the same styles adopted for the operating manuals. It provides examples of the writing principles, required organization, and standard formats used for the operating manuals.

It is organized so that you can read it from front to back to get an understanding of the development process, or you can quickly "drill down" to selected topics to read only the information needed to perform a given task.

1.3 Training Course

Training is provided to individuals assigned to develop, update and revise the operating manuals. Training is based on the Guidebook and is designed to provide core knowledge and skills to begin work on the operating manuals for their units.

Major topics covered during the training include:

- Standardized content / format for the operating manuals
- Technical writing process for producing process and equipment descriptions and other data to satisfy OSHA and Chevron requirements and Human Factors Requirements.
- Capturing job task analysis (JTA) data to most effectively support the operating manual development efforts
- Identifying and applying human factors to procedure development.
- Procedure writing process for producing normal operating procedures and emergency procedures from JTA details
- Developing on-the-job training (OJT) materials portion of the operating manual, based on JTA data and effective integration with procedures
- Converting and upgrading materials from existing operating manuals
- Use of templates (being provided to and standardization the EOM.)
- In-class practice and application to units
- Involving subject matter experts effectively
- Getting materials properly reviewed and approved
- Managing the manual development effort

1.4 EOM Format Change Process

Many people will have good ideas on how to improve the EOM. Because changes to the EOM can impact other refineries or Chevron's interpretation of OSHA requirements, it is important that individuals do not change the EOM on their own. A lot of thought by operators, management, and contractors has gone into the design of the EOM and its development process.

The Guidebook has human factors guidelines built in to the development process. Because comprehensive human factors programs are required by county ordinance based on California Health and Safety Code Article 2 random changes to the established development process of the EOM must meet the human factors criteria.

If you have changes to the EOM contact Manuals and Procedures Group at Learning & Development.

2. OPERATING MANUAL CONTENT

Most of us are used to working in a paper environment, so it is helpful to think of issues involving the content and organization of information using terms like: manual, volume, chapter, section, binders, book tabs/dividers, etc. The Guidebook uses this terminology to keep explanations as straightforward as possible. In particular, we refer to the:

operating manual for a plant or unit
volumes making up this manual
chapters dividing major information topics within each volume
sections and subsections making up each chapter

When moving into the computerized information environment terms have a different meaning. Helping the reader find the information needed requires a variety of unique electronic features to help the user navigate quickly through the body of knowledge and find the desired information. For example, you might push a button to jump to the screen you want; rather than grab the tab and thumb through some pages to find the data. It is very important to organize information logically and ensure all the content users need is available and in a format easily located.

2.1 Operating Manual Organization

Chevron's electronic operating manual (EOM) is divided into four major volumes, as illustrated in Figure 2-1. This figure shows that operators use other information not found within the operating manual. This is referred to as **GENERAL INFO**. Using links to general information from the operating manual display quickly moves the user to the general information on the same screen.

Figure 2-1 Organization of Information Needed by Operators

<table>
<tr><th colspan="3">ELECTRONIC
OPERATING MANUAL</th><th>GENERAL INFO
WEB - Refinery Home Page</th></tr>
<tr><td>Volume I
PROCESS AND EQUIPMENT DESCRIPTION</td><td>Volume II
OPERATING PROCEDURES
- Normal
- Alarm
- Routine Duties</td><td>Volume III
EMERGENCY PROCEDURES</td><td rowspan="2">• Instructions (RIs)
• Incident Records
• Drawings
• MSDS
• SIS
• PHAs
• Forms
• Safety
• Environmental
• General Refinery Data</td></tr>
<tr><td colspan="3">Volume IV
TRAINING GUIDE</td></tr>
</table>

ORGANIZATION OF THE MANUAL

The general strategy for organizing the operating information recognizes that different people use information for different purposes. Also, from a human factor perspective it can

be confusing to mix procedural information with descriptive or narrative information, so these are segregated.

Information directly related to the operation of a unit is contained in Volumes II, III, and I.

Descriptive information on process and equipment is placed in Volume I to serve as a job reference and a training reference.

Procedures, which are action step oriented, are contained in Volumes II and III. Procedures are written at two levels of detail:

- summary steps for the experienced operator
- detailed steps for the newly qualified operator and the trainee.

The Training Guide, Volume IV, supports the other three volumes by providing instructions for qualifiers, instructors, and trainees on how to conduct on-the-job training (OJT). Volume IV contains job aids, which supplement information contained in the other volumes, but designed to be especially helpful to the trainee for learning and mastering job tasks.

Electronic Manual Concept

The EOM is a computer-based system designed to allow on-line access to information in an efficient manner, allowing the operator to move quickly to the information needed without scrolling through a great deal of non-pertinent information. On-line access is accomplished using a full-featured software product called Acrobat Reader.

It provides point-and-click access to operating manual information and other pertinent information and navigated through as if moving through a paper manual. Similarly, operators can move from one page to another related page with the click of a button. Finally, anything viewed on the screen can be printed.

The file-naming conventions contained in Appendix K must be used when creating electronic files.

Purpose and Content Guidelines for Each Volume

Table 2-1 summarizes the purpose of each volume of the EOM and defines the general content needed to satisfy that purpose.

Table 2-1 Purpose and Content Guidelines for Volumes of Operating Manual

Volume	Purpose	Content Guidelines
I. PROCESS AND EQUIPMENT DESCRIPTION	• Common reference of unit knowledge for experienced operator. • Easy-to-use reference on more common information needed by all operators. • Training reference for new operators.	Provides general and detailed descriptions of the: - theory of operation - process flow - detailed equipment description - utilities and supporting systems - safe upper/lower limits - consequences of deviation - major hazards - safety systems - troubleshooting
II. OPERATING PROCEDURES and III. EMERGENCY PROCEDURES	• Easy-to-use reference for normal operation and emergency situations. • Presents stepwise sequences experienced operators must know how to carry out. • Establishes common understanding of approved methods for accomplishing tasks. • Training reference for new operators.	Normal procedures provide concise step-by-step instructions for proper normal operation. Emergency procedures provide steps for recovery to stabilize the unit and return to a safe condition following an emergency. Both provide stepwise sequences to document approved methods.
IV. TRAINING GUIDE	• Lets trainees know the knowledge and skills to master. • Gives experienced operators and trainers clear guidelines for the information that needs to be conveyed to operators. • Serves as a frame of reference for establishing qualification or certification programs.	Structured on-the-job training guide for operating technicians at each unit. Contains unit level information that can be used for initial training and refresher training. Contains certification instruments. Provides job aids designed to be especially helpful to the trainee for learning and mastering job tasks.

2.2 Volume I - Process and Equipment Description

Volume I, Process and Equipment Description, contains unit orientation information for the operator. The intent is to provide a good understanding of the unit and the key issues involved in its operation. Volume I serves as a common reference for the descriptive information about the plant that operators need to make good decisions.

This volume is written in a narrative format, using figures, tables, and other visual aids to enhance comprehension. The purpose is not to be an engineering reference, nor is it to cover all possible

nuances of unit operation. Rather, this volume covers information needed to understand unit operations. Volume I helps the operator to develop mental models of how the unit operates.

Use a deductive writing style to develop Volume I. This helps the reader by organizing information into logical chunks and presenting the information in a consistent systematic manner. Section 5 of this Guidebook describes how to create each section/subsection of Volume I, and Appendix E explains how to use the deductive writing style effectively.

See the standard table of contents for Volume I, Standard Table of Contents for Volume I, Process and Equipment Description

2.3 Volume II - Operating Procedures & Checklists

Volume II, Operating Procedures, contains procedures and checklists for all major tasks involved in operating the unit. This volume is divided into ~~three~~ four major types of work instructions:

- Normal procedures
- Checklists
- Alarm procedures
- Routine duties

Normal Procedures and Checklists describe how to carry out normal operations for equipment, systems, and the unit during startup, shutdown, normal operations, and special situations. Procedures and Checklists are organized into the following standard groupings:

- 1000 Series – Commissioning
- 2000 Series - Startup
- 3000 Series - Shutdown
- 4000 Series - Equipment
- 5000 Series - System

Alarm Documents explain how to confirm operability of the alarms and how to respond to a given alarm.

- 6000 Series - Alarm response

Routine Duties are documents associated with regularly scheduled tasks performed as part of normal conduct of unit operations. These are the 8000 series.

Finally, the 9000 series is reserved for temporary procedures.

Procedure and checklist formats are carefully structured to provide a trained operator only the information needed to do the job. ~~The~~ Standard procedure and checklist formats intentionally avoid including unnecessary descriptive information within the documents. Notes, cautions, and warnings are kept brief to provide only the information needed to do the job safely, efficiently, and within environmental requirements. Section 6 of this Guidebook and Appendix G/H describes in detail how to use the procedure writing style and standard procedure and checklist formats to create the contents of Volume II.

The Standard Table of Contents for Volume II illustrates the standard approach for grouping procedures in a logical manner organizing by a procedure numbering system. For example, the 2000 series is reserved for Startup Procedures, the 3000 series is reserved for Shutdown Procedures, and the 4000 series is reserved for equipment related procedures and miscellaneous procedure categories. Within the 4000 series, a typical organization is:

- 4100 Reactors
- 4200 Columns
- 4300 Vessels or Drums
- 4400 Furnaces
- 4500 Pumps and Drivers
- 4600 Exchangers/Coolers
- 4700 Miscellaneous Equipment
- 4800 Routing and Flushing
- 4900 Administrative

The Standard Table of Contents for Volume II shows an important numbering convention that is to use the thousands, hundreds, and tens positions to logically organize groups of procedures. The thousands and hundreds positions are standard for Chevron Refining units. The tens position is part of the assigned sequential procedure, and can be used to logically group procedures together.

For example, the tens position can be used to group the 4000 series equipment related documents by each unique equipment number. In other words, collect all equipment for V-2311 in one place, perhaps in the 4250 series. Notice that the titles for all of the equipment documents in the Standard Table of Contents for Volume II begin with the equipment number to facilitate this type of numbering scheme logic. Another convention is to list all of the generic documents first within a grouping.

2.4 Volume III - Emergency Procedures

Volume III, Emergency Procedures, contains the approved procedures for responding to emergency situations. These procedures are organized into standard groupings to take into account the various types of emergency situations.

Two separate procedure formats are used; a summary procedure format, and a detailed step format. The summary format appears as the first page of each procedure, and the detailed steps immediately follow. For both formats, the Emergency Procedure is divided into three parts to help the user:

- Immediate actions
- Stabilizing actions
- Exit actions

Section 7 of this GUIDEBOOK and Appendix I/J describes in detail how to use the writing style and formats to create the contents of Volume III.

Standard Table of Contents for Volume III, Emergency Procedures shows a standard set of emergency procedure groupings (categories of emergencies) applicable for most units. Emergency

procedures have a *three-digit number* rather than a four-digit number. This allows emergency procedures to be easily distinguished from all of the other types of procedures.

2.5 Volume IV - Training Guide

Volume IV, Training Guide, guides' trainees, instructors, and qualifiers through a structured on-the-job training (OJT) process. It contains information that is intended to:

- Assist trainees in gaining the knowledge and skills needed to perform the tasks associated with plant/unit operations safely and effectively.
- Assist qualified operators with refresher training.
- Guide instructors in providing OJT in a structured, logical manner; and doing this consistently from one trainee to the next.
- Guide qualifiers in using a thorough, effective, and consistent approach to determine that individual's are qualified for their job assignment.

The Standard Table of Contents for Volume IV shows the Training Guide. It is created by combining the well-established training practices of the operating division with the job analysis performed for each job position within the division.

2.6 General Refinery Information

The Refinery Home Page has many sources already captured in databases or collected on a web page by department or topic of interest. Link to these sources as needed and review the homepage often as more and more information is made available in this manner.

The list of high value documents to consider follows. Look for this information and link or refer to it:

- MSDSs
- P&IDs
- Refinery Instructions
- Emergency Response Manual
- Environmental Manual
- Safety Manual
- PFCDs
- Engineering Instructions
- Safety Instruction Sheets (SIS)
- Storehouse Stock Manual
- CRTC Process Manual
- Electrical Supply & Distribution
- Oil Spill Response Manual
- Piping Specifications
- Machinery Reliability Manual
- Electrical Classification
- Relief System Design

2.7 Comparison to Previous Chevron Operating Standards to Electronic Operating Manual

Chevron operating standards are used as a basis for developing the content and organization of the electronic operating manual. Other considerations included process safety management information needs, best practices, and considerations for the electronic presentation of information and human factors.

Comparison of Chevron Standard to the Electronic Operating Manual compares the current organizational structure to the previous commonly used "14-tab" Operating Standard. A more thorough presentation of this comparison is provided in Section 9 to help in converting existing manuals into the EOM format.

2.8 OSHA/PSM Compliance and the EOM

As part of the 1990 Clean Air Act Amendment, OSHA promulgated regulations commonly referred to as PSM (Process Safety Management) in the May 26, 1992 Code of Federal Regulations (29 CFR 1910.119). The 14 elements of the PSM regulation cover the following areas:

- Employee Participation - involves employees in developing PSM.
- Process Safety Information - defines process chemicals, technology, and equipment.
- Process Hazard Analysis - evaluates potential hazards.
- Operating Procedures - documents steps to operate the process safely.
- Training - ensures operators understand the hazards of the process and how to safely operate the process.
- Contractors - ensures contractors operate safely and understand process hazards.
- Pre-Startup Safety Review - ensures new and modified processes are safe to operate.
- Mechanical Integrity - ensures equipment reliability.
- Hot Work Permits - establishes controls for potential fire sources.
- Management of Change - establishes controls for changing the process or its information.
- Incident Investigation - ensures incidents and near misses are investigated promptly and recommendations are implemented.
- Emergency Planning and Response - establishes a plan and management for responding to emergencies.
- Compliance Audits - ensures programs are being used.
- Trade Secrets - makes all necessary information available.

Paragraph (f) of the fourteen-element regulation addresses requirements for "Operating Procedures." The requirements of other paragraphs such as (Operator) Training, Process Safety Information, and Management of Change must work effectively together with facility-specific administrative controls to ensure the effectiveness and longevity of the Operating Procedures being developed through the electronic operating manual effort.

Highlights of the regulation require Chevron as "the employer" to "develop and implement written operating procedures that provide clear instructions for safely conducting activities involved in each covered process..." These procedures must be "consistent types of procedures and information." They must also be "readily accessible," continually managed to reflect changes and actual practice and be certified annually as "current and accurate."

Paragraph (g) (Training) requires employees involved in operating a process be "trained in an overview of the process and in operating procedures as specified in paragraph (f)." Also, the "Employee Participation" paragraph requires Chevron consult with employees on the development of information used for compliance with the operating procedures' regulation.

The EOM is designed to be compliant with the regulatory requirements of the "Operating Procedures" element (see Comparison of OSHA PSM Regulation with Electronic Operating Manual).

Volume IV of the EOM is an integral part of complying with the regulatory requirements of the "Training" element.

The Comparison of OSHA PSM Regulation with Electronic Operating Manual cross references primarily the Operating Procedures portion of the regulation to the appropriate section(s) of the electronic operating manual of the future to demonstrate it's compliance.

Revision Record

Date	Reason for Change	Comments
6/22/12	Audit Findings	Updated section 2.3 to include the definition and use of checklists
7/17/12	Audit Finding solution	Removed reference to alarm test. Alarm Test Templates will no longer exist. Each alarm test scenario will be run through the Criticality Index to determine the appropriate Work Instruction/Template

DEVELOPMENT PROCESS OVERVIEW

This section describes how operating manuals are developed based on Chevron's experience. It explains the EOM project phase from 1993 to 1998 and updated to reflect current practice. It is a systematic, logical approach to ensure high quality, achieve cost-effective use of time, and avoid rework. A development process is presented, followed by strategies for developing materials and managing the material. The development process is presented in four phases to identify the relationship between the tasks that are performed to complete a manual. Job task analysis is discussed in detail in chapter 4 of this GUIDEBOOK.

3.1 Process to Develop EOM

The model process for developing the operating manual is designed to join the operating manual effort with Chevron's job task analysis/training development. The analysis and development tools for these efforts are combined and streamlined to maximize quality and efficiency and to produce a product that can be readily applied for training purposes. In addition, the tools support regular work needs by integrating procedures, process information, and equipment information, and training in a logical and mutually supportive manner.

The four phases of EOM Development are:

FRONT END ANALYSIS (1992/1993)
- Collect and Review Plant/System Material
- Conduct Job Task Analysis
- Develop EOM Master List

PROCEDURE DEVELOPMENT
- Update/Review Existing Procedures
- Write/Review Existing Procedures
- Write IQ Guides for New Procedures and Train End Users

TRAINING MATERIAL DEVELOPMENT
- Write/Review/Approve Volume I
- Search System for Available Training Material
- Write/Review/Approve Task Details
- Write Volume 4 Solo and Final Lesson Plans
- Write IQ Guides for Tasks and Procedures
- Create Job Aids for Tasks and Procedures
- Review and Approve Volume IV

EOM DEPLOYMENT
- Publish Volume IV on Local Network
- Press Volumes I - IV into the Web Document Manager Application
- Notify Central Document Group/Remove old documents from Local Network
- Train ABU on EOM use through the Net

3.2 EOM Development Work Process

Planning and coordination is needed between each phase of development and the individuals working on each phase. The process is constructed to include basic efficiencies and help individuals work together in parallel, so team members can understand how the pieces fit together. The following are team players:

- Lead Developer: Is responsible for organizing, tracking, updating and implementing the Unit/Plant manual. Original to the EOM Project, now called an EOM Developer/Manual Developer.
- EOM Developer/Manual Developer: Is responsible for organizing, tracking, updating and implementing the unit/plant manual.
- Subject Matter Expert: Is a person who has practical and technical working knowledge of a subject or work process. Most operators/mechanics with years of job experience fit this category.
- Task Analyst[1]: The task analyst was used during the project phase of the EOM to perform Job Task Analysis. During 1992/93 the Richmond Refinery completed job task analysis for every operating job. This was incorporated in the Front End Analysis and used to develop the EOM Masterlist that identified all tasks for each operating job in the refinery. The task analyst job was retired with the end of the EOM Project in October 1998. Instead, trainers and manual developers are instructed on how to interpret the JTA results in order to complete EOM development efforts.
- Document Editor[2]: Document Editors where used during the project phase of the EOM, some where contractors, others where special assignment individuals who focused on word-processing and document layout. In most cases Document Editors and subject matter experts (SME) did not perform the same job functions. Typically, SMEs possessed plant operating knowledge.
- Technical Editor: Individuals responsible for tracking, managing and developing electronic documents at the EOM and experts in managing documents electronically once created. Most Technical editors are not subject matter experts in plant operations. They coordinate with the Document Administrator who manages the electronic document library.
- Section Trainers: Individuals who possess expert job knowledge and frequently called upon as a Subject Matter Experts. Responsible for creating the Training Guide (Volume IV of the EOM), completing new hire break in training, refresher training, writing procedures and all specialized training required as a result form MOCs.

[1] The Task Analyst job was retired when a halt was placed on the EOM Project due to business needs in 1998. Gradually the task analyst job was phased out.
[2] Document Editors have often been confused with Technical Editors which are permanent positions of ABU defined responsibilities. Technical Editors have highly developed expertise in Information Technology particularly around web page management and electronic document management.

- Process Masters: Usually (but not limited to) engineers in a specific field, i.e. process, design, environmental, health, safety. Responsible for verifying specific process/design guidelines specific to their discipline.

This method takes advantage of the information that already exists and ensures that information is complete and documented in a standard, user-friendly format, and in a media suitable for viewing.

The GUIDEBOOK provides guidelines and examples of writing principles, required organization, and standard formats. The remainder of this section provides an overview for each of the four phases of the development process. Later sections in the Guidebook will provide details for performing all of the necessary tasks in the development process. These details are sufficient for the training and of manual developers and ABU trainers.

3.3 Phase One: Complete Front End Analysis (FEA)

FEA consists of three steps that result in the identification of all procedures and tasks that are necessary for PSM compliance and the ABU training needs. These three steps are:

- collect and review plant/system material
- conduct the job task analysis
- develop EOM master list

The first step is to collect and review all existing material that assists the manual developer and ABU trainer in identifying procedures and tasks. Material(s) to look for are:

- List of all existing procedures
- P&IDs and other drawings
- Existing training material
- System search of Network file server to obtain material from a similar plant or process.

Once the above materials are assembled, these individuals, along with as many qualified subject matter experts (SME's) the ABU can provide, will schedule and conduct a job task analysis for all jobs associated with the plant or process being developed. The job analysis is performed by breaking the job(s) down into duties, which describes the general responsibilities of the job, and tasks, which identify what the operators have to do to perform the job.

For each task, identification is made to characterize the criticality of the task and the frequency of performance. The conventions for these are:

CRITICALITY	FREQUENCY	COMPLEXITY
H = Critical	R = Rare	C = High
M = Moderate	O = Occasional	M = Medium
L = Low Criticality	F = Frequent	S= Simple

Characterizations are useful for making decisions on when procedures and job aids are needed. A numerical weight convention is helpful in making decision and developing prioritization of tasks.

CHARACTERIZATION	GUIDELINES	WEIGHTING
	CRITICALITY	
H = High Criticality	If performed incorrectly, consequences could reasonably be: • Fatality or a severe injury requiring hospitalization • Significant Loss of Containment (LOC), i.e., > 7 bbls of liquid hydrocarbon, > 1100 lbs. LPG, or > 55 lbs. H2S • Asset loss > $ 500K • Significant Environmental release (Major unplanned flaring, community impact, outside agency response and intervention)	3
M = Moderate Criticality	If performed incorrectly, consequences could reasonably be: • Recordable injury without hospitalization • Moderate LOC, i.e., 1 – 7 bbls of liquid hydrocarbon, 110 - 1100 lbs. LPG, or 5 - 55 lbs. H2S • Asset loss > $ 100K and < $ 500K • Moderate environmental release or compliance event (reportable flaring, permit exceedances)	2
L = Low Criticality	If performed incorrectly, consequences could reasonably be: • First aid • Small LOC, i.e., < 1 bbl of liquid hydrocarbon, < 110 lbs LPG or < 5 lbs H2S • Asset loss < $100K • Minor environmental event (non-scorecard or reportable releases)	1
	FREQUENCY	
R = Rare	Performed rarely, usually every six months or more (usually unpredictable).	3
O = Occasional	Performed on a periodic basis, approximately every one to three months.	2
F = Frequent	Performed regularly, at least weekly.	1
	COMPLEXITY	
C = High Complexity	**Operations** - Requires the coordination of multiple Operators/process units across different sections or ABU's and typically would be expected to last longer than one shift. **Maintenance**- The use of specialty tools is required to perform task. Calculation(s) are generated or used to perform task. The task requires data collection.	3
M = Medium Complexity	**Operations**- May involve multiple Operators/process plants within the same section. Task may last more than a shift. **Maintenance** – Multiple resources required to perform task. LOTO is pre-requisite or part of task. Analog or digital value is generated or used to perform task.	2
S = Simple	**Operations**- Task performed by a single field Operator possibly in conjunction with a Control Board Operator, typically in a single process unit, and can be normally completed in one shift. **Maintenance** – Hand or standard craft tools used to perform task. Task performed by a single resource.	1

The final step of the FEA phase is to develop the EOM Master List. The Master List is a planning and tracking tool that enables the manual developer and trainer to identify what type of documentation to create for all items identified in the job task analysis, and establish a file name for each document.

Judgement is needed when deciding when to create a job aid or procedure. The process is helped by using the Criticality Index shown above is used by the LD and trainer along with the following guidelines:

- Written procedures must be developed for the highly critical tasks. This is consistent with the OSHA requirements and is human factors driven.
- Written procedures are needed when consequences of error are severe. This is consistent with RISO.
- Written procedures are needed when the task being performed is complex (large number of steps, or non-intuitive actions).
- Written procedures are needed when the task is infrequently performed and therefore more easily forgotten.

Chapter 4 provides information about the methodology and tools used to conduct the Job Analysis and to create the EOM Master List.

3.4 Phase Two: Procedure Development

Once the FEA is complete, the first priority for the EOM development team is to write the procedures for the unit, have them reviewed (ABC Review Process) for accuracy and completeness, and publish them for use by operations. By conducting the job task analysis, the development team will identify both existing and new procedures.

The development process is for the manual developer is to begin writing new procedures or updating existing procedures and converting them to templates provided for EOM development.

There are four types of procedures that are developed during this phase of development. These four types are:

- Emergency Procedures
- Normal Operating Procedures
- Alarm Response Procedures
- Routine Duties Procedures

Flow charting and outlining techniques are used to develop a logical organization for the procedures. These techniques are detailed later in this guide.

Instructor/Qualifier Guides, used to direct training sessions, are developed for all new procedures that are created, and training is conducted for all operations personnel qualified to work a job covered in the EOM.

The last step in the procedure development phase is to publish the procedures on the refinery network so operators can gain immediate access to a procedure whenever they have a need. As an ABU has a collection of procedures completed, the manual developer and trainer notify the ABU and demonstrate how to access the information. Once procedures are approved and published (ABC Review Process), the Management of Change (MOC) process drives changes to procedures.

Chapters 6 and 7 of this GUIDEBOOK detail the development process for procedures.

3.5 Phase Three: Training Material Development

The training material development phase consists of writing Volume 1 (Process Information) and Volume IV (Training Guide).

WRITING VOLUME I

Volume 1 is written by the Manual developer who uses their expertise in plant operations, as well as the knowledge of other experienced operators in the ABU, to provide detailed information about the process. Volume I is reviewed for accuracy and completeness by operators, safety personnel, environmental personnel, and process engineering when necessary. Once the volume is reviewed (ABC Review Process) and all appropriate changes are made it is approved by the ABU management team.

Chapter 5 of this GUIDEBOOK details the development process for volume 1.

WRITING VOLUME IV

During this phase of EOM development, there are two main objectives being work simultaneously. These objectives are the data collection and material development of non-procedural tasks and the development of the lesson plans for "Solo" and "Final" Training Qualification Modules. These training modules are the guidelines for the classroom portion of the training process that indicate what material is used and where to find it.

Data is collected for non-procedural tasks by means of conducting Subject Matter Expert (SME) interviews in which task details are produced. Task details are the foundation for subsequent training material or job aids that will be created for instructional purposes. The task details are collected and organized in the Microsoft word templates created for this purpose. Task details must be reviewed by other SME's in order to assure they are complete and accurate

The Manual Developer can be used as the primary SME for the task detail interviews.

Once the task details have been created, the information gathered to create training material referred to as job aids. Job aids are graphical, user-friendly documents that provide step-by-step instructions in a clear, easy to understand format. Job aids use digitized photographs, simplified flow diagrams, drawings, and text to communicate the information needed to gain proficiency for a task. Job aids can be referred to at any time for refresher training or as a resource for information.

The final step in the development of Volume 4 is creating Instructor/Qualifier Guides (IQ Guides) for the remaining non-procedural tasks. IQ Guides are used to give the instructor, qualifier and trainee complete information on what the learning objectives are for a specific task, and references any and all training material that is used for that topic.

Once all of the above mentions documents are completed and approved then are assembled and turned over to the ABU for review and approval. Once approved at the user level, Volume IV is published on the local refinery network until the entire EOM is loaded into the document administrator application. Volume IV is updated as needed and kept current through the MOC process.

Chapter 8 of this GUIDEBOOK details the development and review process (ABC Review Process) for the Training Guide.

3.6 Phase Four: EOM Deployment

The fourth and final phase of EOM development is deployment. It is one of the most crucial to the success of this effort. Months of work have been devoted to this development effort and without an effective deployment plan the ABU will be unable to maximize this new resource in their day-to-day operation.

Develop deployment plan

Once the EOM is complete and viewable on the refinery network, the manual developer, ABU trainer, and all other individuals that worked on the manual will cooperatively train ABU management and crews. This is accomplished by facilitating instructional sessions that demonstrate the content and navigation of the EOM collection.

ABU personnel are encouraged to spend time using the EOM to become knowledgeable on the information contained in the collection and how to access it. ABU trainers are trained and familiar with the content and how to use the lesson plans in Volume IV for solo, final, refresher and ongoing training needs.

ABU personnel are informed that the MOC process drives the maintenance of the EOM. An MOC is generated from the ABU that identifies the change. The MOC is forwarded to the Maintain-Sustain personnel assigned to the ABU to incorporate the changes and reissue the update documents. This ensures the EOM is "evergreen" and reflects how work is currently being performed.

Once the EOM has completed end user review and management review, it is approved and available on the refinery network. All old versions of information are removed from fileservers and everyone uses the EOM as the source of operational information.

Maintain Sustain Process

ABU personnel are informed the MOC process drives the maintenance of the EOM. An MOC is generated from the ABU that identifies the change. The MOC is reviewed by the Manuals and Procedures Team who assist in tracking changes to documents and works with the ABU to update documents. This ensures the EOM is "evergreen" and reflects how work is currently being performed.

"A-B-C" Review Process

GOAL: 5-10 weeks from "Draft" to "Final" Version
(depends on document complexity)

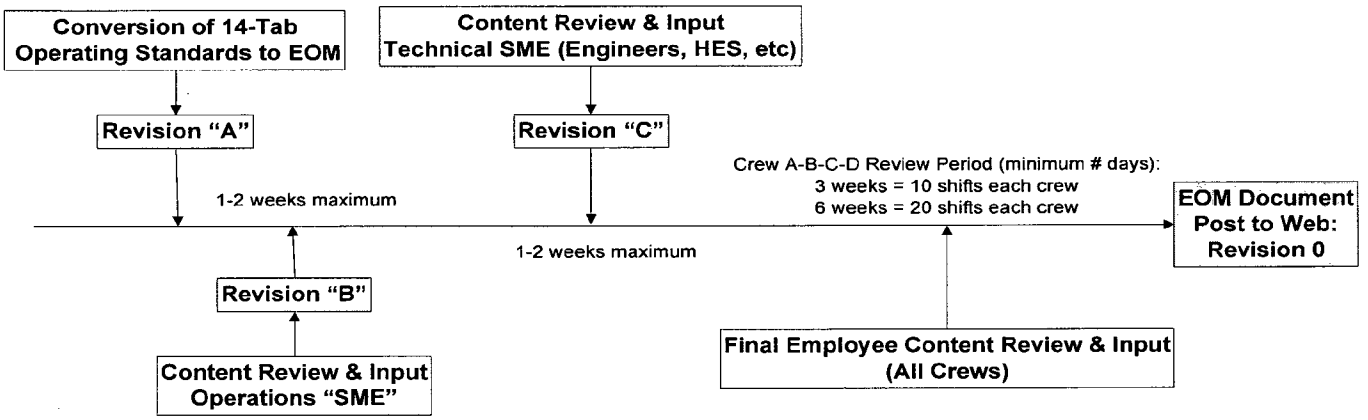


Figure 3.1, ABC Review Process

Revision Record

Date	Step #	MOC #	Comments
7/17/12			Updated Criticality Index information to reflect current index components.

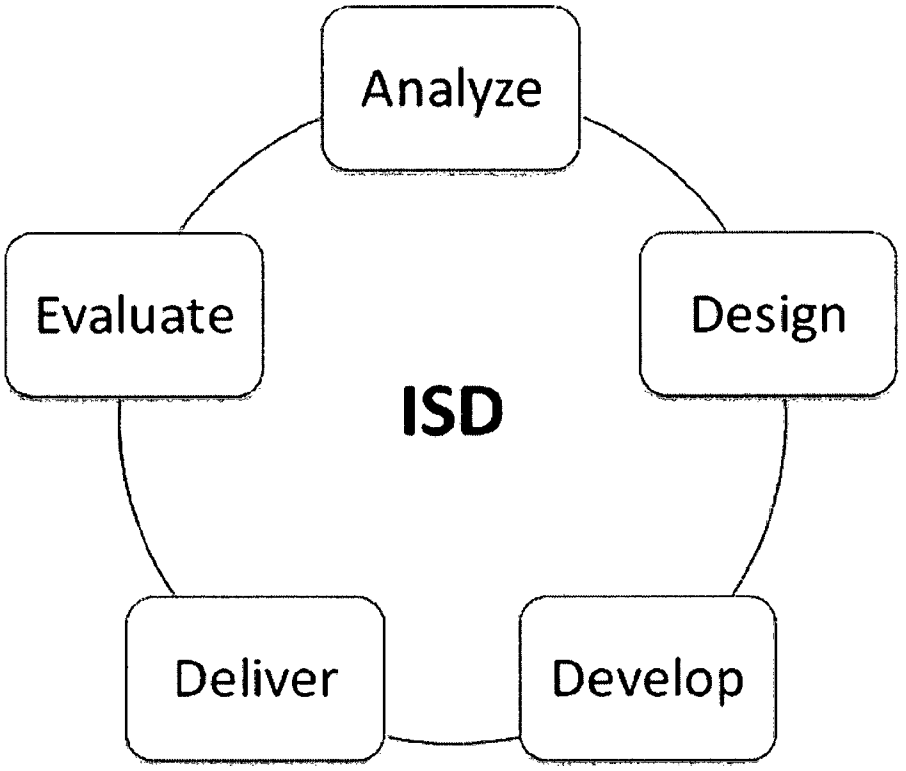
4. DETAILS FOR CONDUCTING JTA

This section provides instruction for performing job analysis, sometimes called front end analysis, for the EOM. It supports instruction and exercises on the skills needed to effectively collect and organize materials used in the EOM development.

Task analysts, and or EOM developers, are responsible for performing the JTA which serves as the basis for the procedures and training materials contained in the EOM.

4.1 Instructional Systems Design (ISD)

Chevron adopted the ISD methodology as a means of assessing and developing performance-based training. This type of training helps link business goals to job performance. ISD provides a systematic approach for developing, delivering, and evaluation training. It has five major phases for addressing training situations:



The major elements of the ISD are described below:

ANALYZE

In this phase, an organization investigates a need for training by analyzing a training request or a performance issue. This request may come from an internal part of the organization or may be the result of the purchase of new equipment or an incident that uncovers the need

for training. This process is vital to the ISD effort because it may determine that training is not necessary and prevent wasted effort.

During this phase, the organization completes a Job Task Analysis (JTA) that details the tasks employees perform, the conditions under which they perform the tasks, the standards of performance for the tasks and other important data.

DESIGN

With a JTA complete, the organization is able to design training that is effective and targets the intended audience. Training material design is based on established learning objectives. These objectives are developed directly from the JTA and are written on a performance-based level. With completed learning objectives, the organization may examine existing material for the training, select instructional strategy, and write a description of the training program.

DEVELOP

In the development phase, the organization uses the JTA and design phase results to construct course materials, tests, and performance evaluation materials. The ultimate goal of ISD is to develop effective training. Achieving that goal is directly related to the quality of the lesson material for the training program. After lesson material is developed, a pilot course is generally offered and evaluated to assess the course quality. Finally, course materials are finalized and instructors certified to teach the course.

DELIVER

After a training course is developed, it must be delivered. The organization conducts the training and evaluates the trainees. This activity provides the organization with an effective way to determine if the course achieves its goal. This is done by testing after training and observing performance improvement in the work place. Also, the training must be documented to provide evidence of completed training. Accurate and up-to-date training records represent the only means by which the organization can track the effectiveness of the training program.

EVALUATE

The organization evaluates training material and instructors to provide suggestions for improving the lesson materials or the delivery of the course. In addition to evaluating the training, it is important to evaluate and quantify what the employees learned during training. To do this, the organization conducts periodic evaluations of performance in the work place. This process allows the organization to keep documented evaluations of performance with recommendations for improvement and to identify and eliminate part of the training program that is ineffective or irrelevant to the target audience.

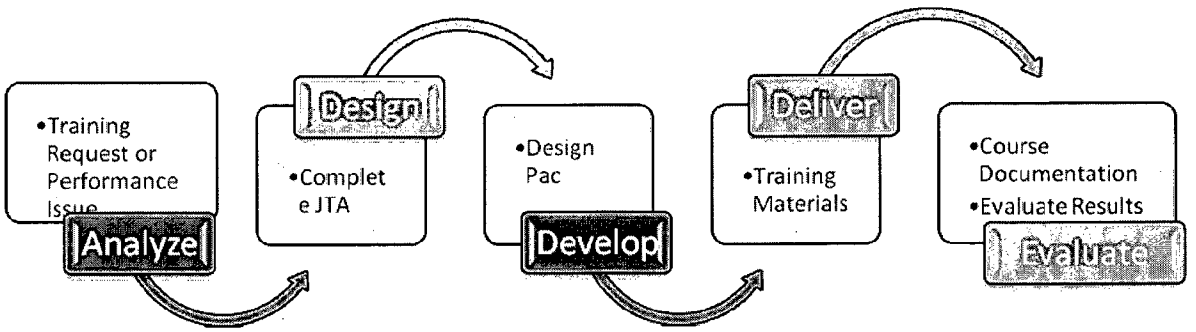


Figure 4.1 1 General Instructional Systems Design (ISD) Model

4.2 JTA Overview

This section presents a general model for JTA and shows the specific adaptation of JTA for development of the EOM. This section describes how steps for JTA and operating manual development efforts are combined and identifies specific tools created to help carryout these steps. Basic terminology of ISD and JTA are defined.

The EOM Development Chart (Figure 4.1.2) shows how the process for developing the EOM is joined with job task analysis/training development process. The analysis and development tools for these efforts are combined and streamlined to maximize quality and efficiency and produce an operating manual that is used for training purposes.

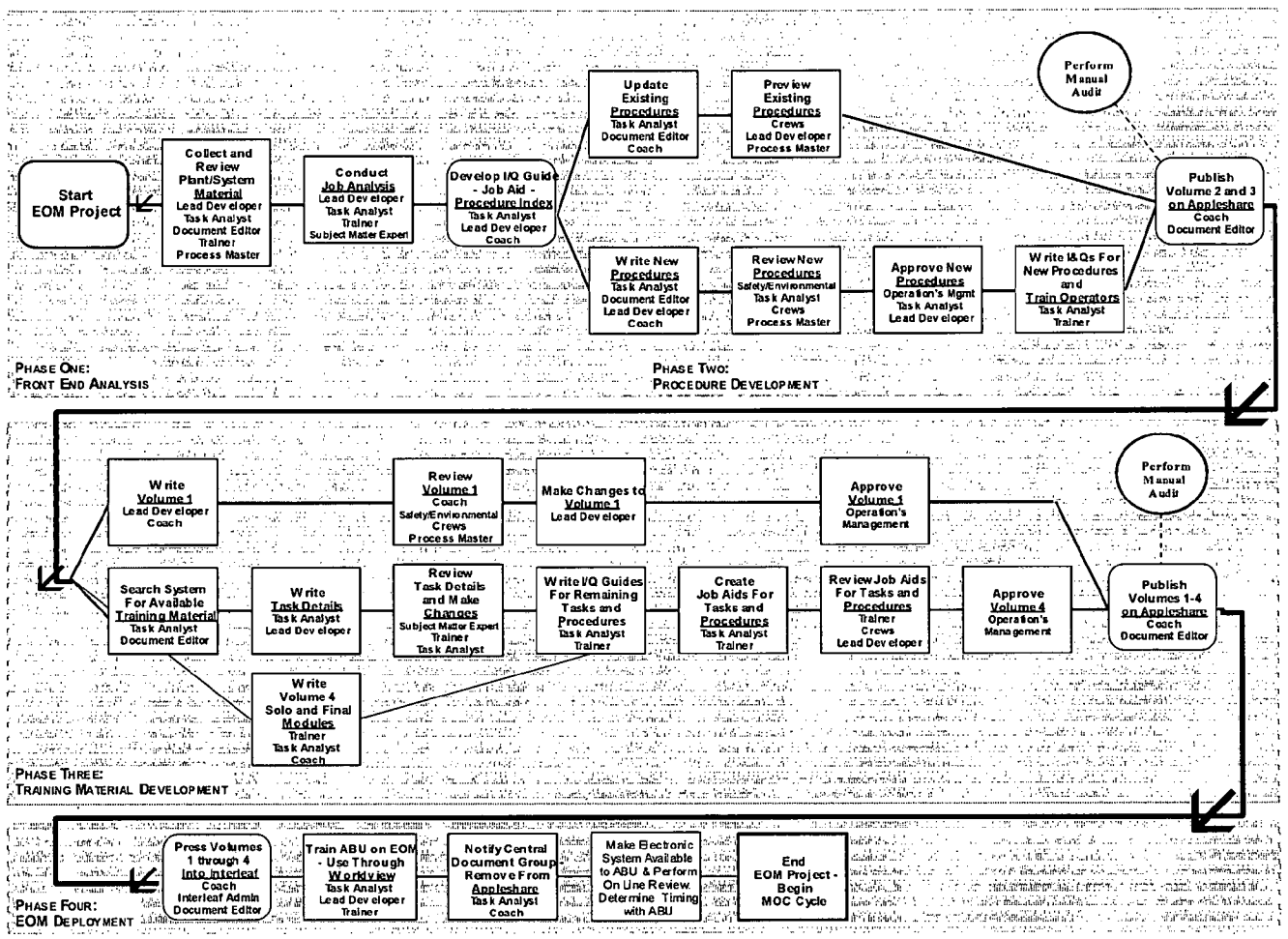


Figure 4.1 2 EOM Development Chart

General Models for ISD/JTA

The following Figure 4.1.3 shows the general model for EOM development at Chevron. Templates support this model and other electronic tools (word processing and graphics related) created to streamline and organize the JTA process for the purpose of creating EOMs.

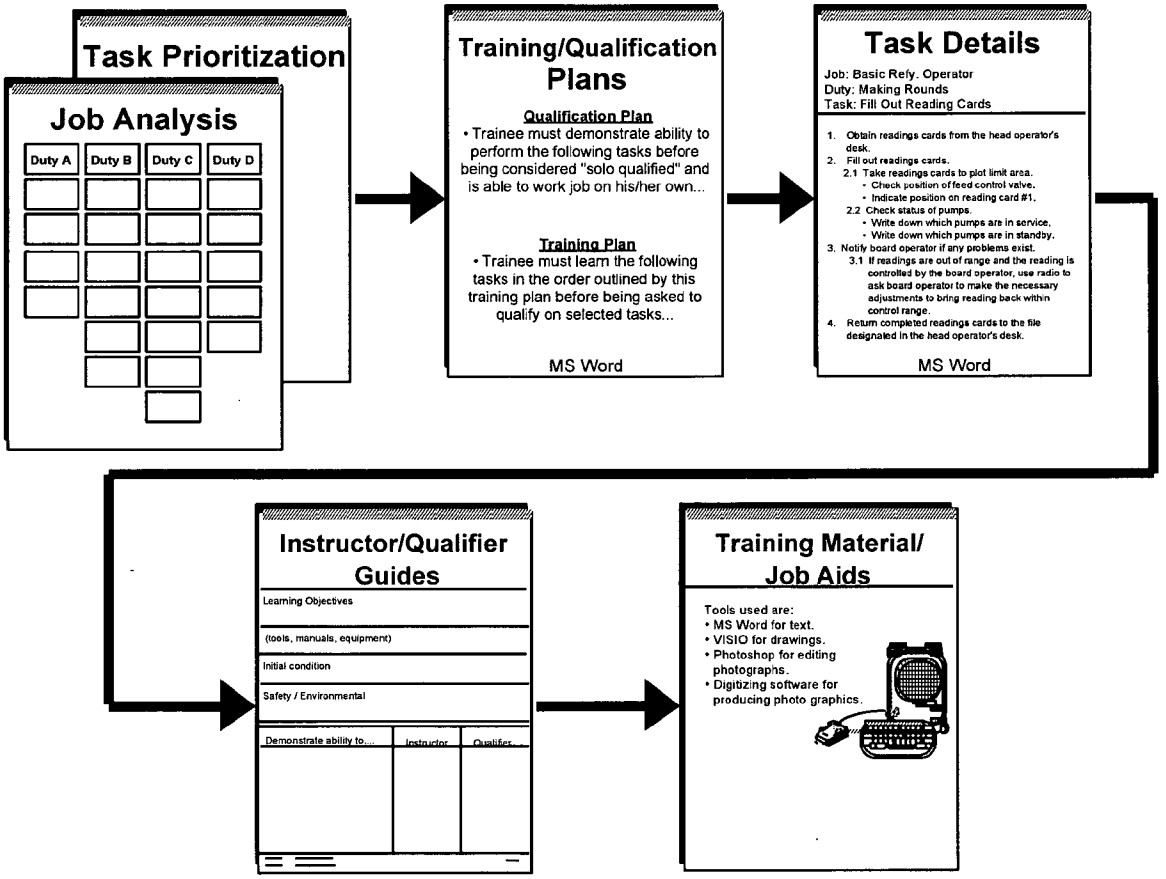


Figure 4.1 3 General ISD/JTA Model

Electronic Tools for JTA and Operating Manual

It is important to distinguish between those steps of JTA which make up analysis conducted to ensure a sound instructional system design form those steps which produce products for the EOM. The former steps are performed and results archived on the file server, while the latter stops product documents that are imported and managed within the document administrator application for the EOM.

Figure JTADVdhrt6.vsd provides an overview diagram, which illustrates how the JTA tasks and EOM tasks have been combined. This overview serves as a quick reference on the

process and electronic tools available to aid in the development of operating manual procedures and training related material.

For each of the steps identified in Figure 4.1 4 there is a preferred method of development that facilitates either incorporation into the publishing system or long term archival in the fileserver. Two types of termination of points for information used in JTA and EOM development processes are:

- Document administrator files
- Temporary file (saved locally)

In some cases the JTA Database is still used for archiving information collected during the job analysis phase of development. On many jobs, the duties and tasks have been identified and rated for criticality and frequency. Information in the database is valuable for developing refresher-training modules. It also provides good reference material when preparing to perform a job analysis in similar areas.

The complete work breakdown structure for JTA and Volume IV development is shown in Figure 4.1 5. The remainder for this course workbook walks through the steps of this JTA process for the EOM.

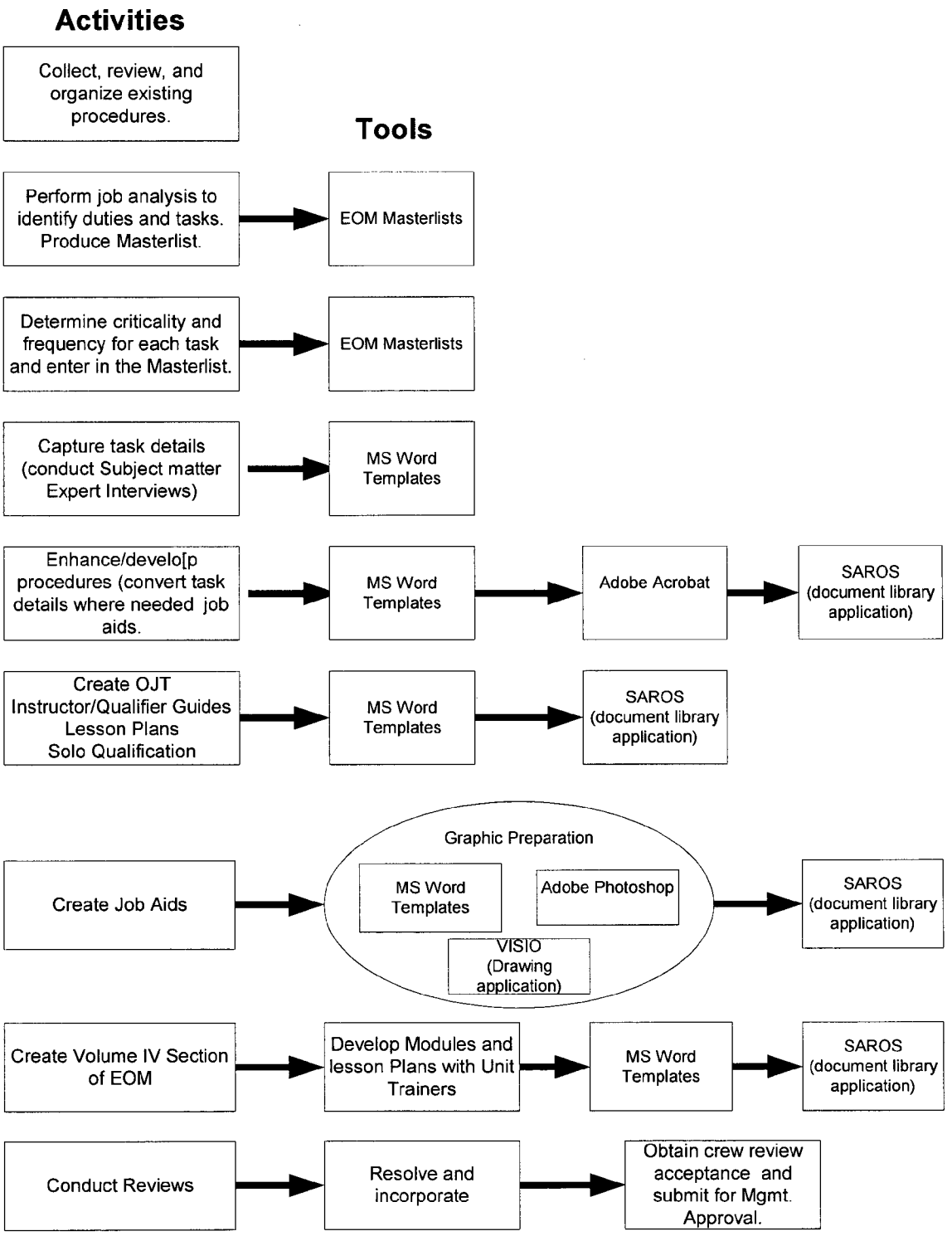


Figure 4.1 6 JTA Activities and Tools

ISD/JTA Terminology - The remainder of this section provides definitions for terminology associated with Instructional Systems Design and Job Task Analysis.

ACRONYM (if applicable)	TERM	DEFINITION
ISD	**Instructional Systems Design**	A logical systematic approach for developing, delivering, and evaluating training. It has five major tasks for addressing any training situation: ANALYZE the training need, DESIGN the appropriate training, DEVELOP the training according to the systematic design, DELIVER the training using appropriate media, and EVALUATE the training to ensure it is effective and to identify any improvements needed. At Chevron, Job Task Analysis (JTA) is an integral part of ISD used to develop effective, performance-based training.
IQ Guide	**Instructor/ Qualifier Guide**	A document which: (1) helps trainees understand what they must learn and do to demonstrate mastery of a task which is considered to be part of their job; (2) helps instructors provide consistent and uniform training; and (3) helps qualifiers provide consistent, effective qualification. This term is often associated with job task analysis (JTA) and instructional systems design (ISD). This is also often referred to as the OJT Instructor/Qualifier Guide. These guides are found in Volume IV, Training Guide, of the EOM for each task associated with a job position.
	Job	A position filled by a person. Examples are: Crude Unit Outside Operator, Boiler Plant Operator, Coker Console Operator. This is a common term for assigning responsibilities within Chevron area business units. This term is also often associated with job task analysis (JTA) and instructional systems design (ISD).
JA	**Job Aid**	A training and performance aid that is used to help master a task. Job aids take many forms and are often highly graphic. Job aids are found in Volume IV, Training Guide, of the EOM. This term is often associated with job task analysis (JTA) and instructional systems design (ISD).
	Job Analysis	An operational description of a job that defines a job in terms of duties and tasks. This is the first major step in performing a job task analysis.
JTA	**Job Task Analysis**	A process that studies the relationships between jobs, duties, tasks, leaning needs, and job performance. This analysis process is used at Chevron to develop materials which guide trainees, instructors, and qualifiers through a structured on-the-job training (OJT) process. This term is often associated with job task analysis (JTA) and instructional systems design (ISD).
	Learning Objective	Skill and knowledge objectives to be covered during training. This term is often associated with job task analysis (JTA) and instructional systems design (ISD).

ACRONYM (if applicable)	TERM	DEFINITION
ISD	Instructional Systems Design	A logical systematic approach for developing, delivering, and evaluating training. It has five major tasks for addressing any training situation: ANALYZE the training need, DESIGN the appropriate training, DEVELOP the training according to the systematic design, DELIVER the training using appropriate media, and EVALUATE the training to ensure it is effective and to identify any improvements needed. At Chevron, Job Task Analysis (JTA) is an integral part of ISD used to develop effective, performance-based training.
	OJT Instructor/ Qualifier Guide	A document which: (1) helps trainees understand what they must learn and do to demonstrate mastery of a task which is considered to be part of their job; (2) helps instructors provide consistent and uniform training; and (3) helps qualifiers provide consistent, effective qualification. This term is often associated with job task analysis (JTA) and instructional systems design (ISD). This is also often referred to as the Instructor/Qualifier Guide. These guides are found in Volume IV, Training Guide, of the EOM for each task associated with a job position.
OJT	On-the-Job Training	This is training done on the job using the normal job environment and equipment of the job. When done properly, it is an extremely effective way to train actual job tasks. This term is often associated with job task analysis (JTA) and instructional systems design (ISD). Chevron uses a structured OJT approach to ensure training is performance-based, effective, and consistently delivered.
	Performance Objective	A desired or expected achievement or accomplishment on the job. This term is often associated with job task analysis (JTA) and instructional systems design (ISD). Performance objectives are included in the OJT Instructor/ Qualifier Guides contained in Volume IV of the EOM.
	Performance Test	An assessment to determine a person's ability to meet performance objectives. Performance tests simulate the task including: equipment, supplies, materials, procedures, and job aids. The goal is for the trainee to demonstrate mastery of the performance objectives. Performance Test items are included in the OJT Instructor/ Qualifier Guides contained in Volume IV of the EOM.
	Qualification Plan	A plan developed by studying a job analysis and existing job qualification material. A qualification plan indicates which duties and/or tasks are included for qualification to work a specific job solo. This term is often associated with job task analysis (JTA) and instructional systems design (ISD). The Qualification Plan is found in Volume IV, Training Guide, of the EOM.

ACRONYM (if applicable)	TERM	DEFINITION
ISD	Instructional Systems Design	A logical systematic approach for developing, delivering, and evaluating training. It has five major tasks for addressing any training situation: ANALYZE the training need, DESIGN the appropriate training, DEVELOP the training according to the systematic design, DELIVER the training using appropriate media, and EVALUATE the training to ensure it is effective and to identify any improvements needed. At Chevron, Job Task Analysis (JTA) is an integral part of ISD used to develop effective, performance-based training.
SME	Subject Matter Expert	A person who has detailed knowledge about how to perform a job or parts of a job. The knowledge and experience of SME's is used in conducting a job task analysis. This term is often associated with job task analysis (JTA) and instructional systems design (ISD).
	Task Analysis	A process that creates a detailed description of how to perform tasks for a specific job. This information is captured in the form of "task details." This is an integral part of the job task analysis (JTA) process and the instructional systems design (ISD) methodology.
	Task Analyst	A person trained to perform job task analysis (JTA).
	Training Plan	A plan based upon a job analysis and qualification plan that indicates the scope and sequence of the training. This term is often associated with job task analysis (JTA) and instructional systems design (ISD). The Training Plan is found in Volume IV, Training Guide, of the EOM.

4.3 Aligning the Area Business Unit for JTA

This section describes how to prepare an ABU for JTA which is about to be conducted and start the process of working with ABU(s) trainer(s) to create what will be needed for the EOM, particularly Volume IV, the Training Guide. It is important that:

- The best existing training practices of the area business unit are reflected in the products of the JTA effort for the EOM.
- ABU(s) trainer(s) understand their responsibility in creating training and qualification plans for the Training Guide portion of the EOM.
- A good working relationship and common work plan exist between the ABU(s) trainer(s) and the JTA efforts.

Division or Area Business Unit Alignment

Ultimately, the success of any project is measured by customer satisfaction. For the JTA efforts to help create the EOM the customer is the area business unit. It is, therefore, extremely important to meet with key area business unit personnel at the start of the effort and ensure a common understanding and support for the work that lies ahead. This is called the ABU alignment.

The task analyst and the lead developer for the EOM need to work together to perform the ABU alignment. They should strive to attend all of the alignment meetings together and work together with area business unit personnel to establish development responsibilities and the schedule.

It is suggested that handouts be distributed at the alignment meetings, which show examples of JTA products; such as a job analysis, task details, OJT Instructor/Qualifier Guides, and job aids. This workbook contains examples which can be used for this purpose. Finally, a demonstration of a finished EOM is a good presentation aid to help ABU personnel understand how this work supports the end products they will use.

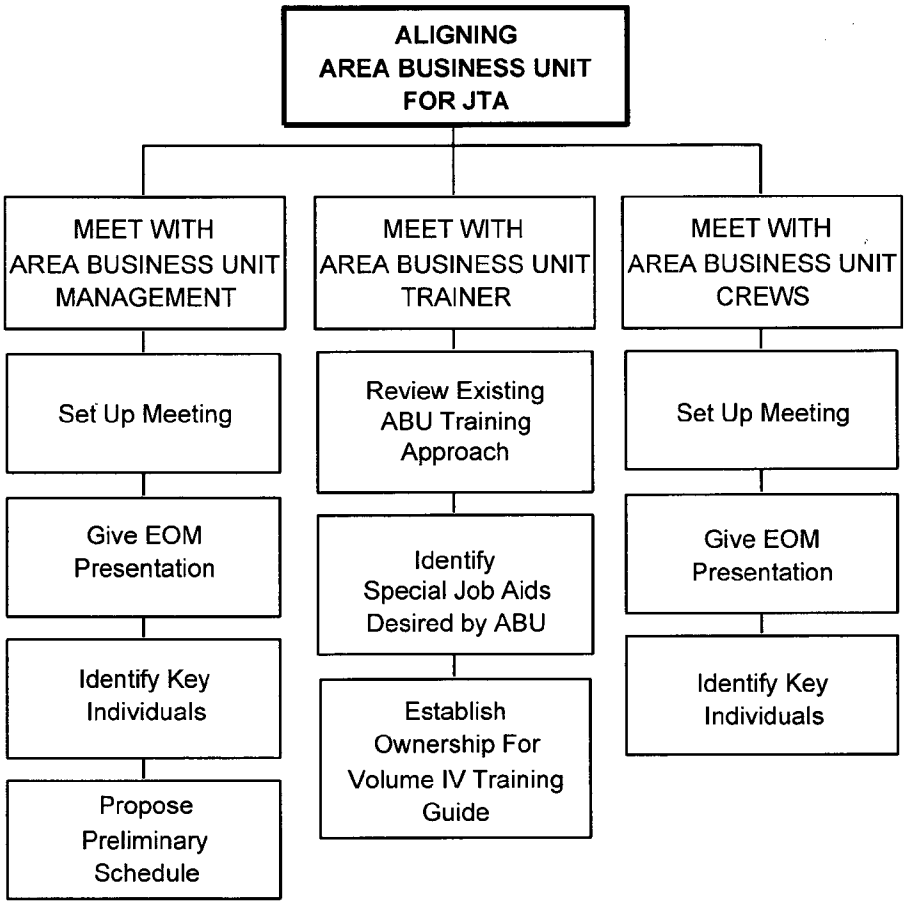


Figure 4.1 7 Area Business Unit Alignment Steps

MEET WITH AREA BUSINESS UNIT MANAGEMENT

The first step in aligning the ABU for JTA is to meet with ABU management. The task analyst normally works with the lead developer for the EOM to set up the meeting. The key objectives of this meeting should be to:

- Introduce the basic JTA methodology.
- Gain management support for the EOM process.
- Identify SMEs for the EOM development effort.
- Present a preliminary schedule that shows milestones such as job analysis completion, procedure completion, OJT Instructor/Qualifier Guide's completion, and job aids completion.

The participants at this meeting are determined by the ABU management structure in the area that you are conducting the analysis. As a minimum, the lead developer for the EOM, the ABU manager, the operating assistant or area supervisor, and a lead technical representative should be present.

MEETING WITH ABU/SECTION TRAINER

It is essential to meet with the ABU/section trainer before the job analysis begins. The key objectives of this meeting should be to:

- Introduce the basic EOM development methodology.
- Gain Trainer support for the EOM/JTA process.
- Review the existing training approach and documentation being used by the area business unit, and identify how this can be integrated with the EOM development effort.
- Establish ownership of Volume IV, Training Guide of the EOM to reside primarily with the ABU/section trainer.
- Discuss the current training method for the job(s) being analyzed.
- Identify any special job aids desired by the ABU, to satisfy known training or job performance needs.
- Present a preliminary schedule that shows milestones such as job analysis completion, procedure completion, OJT Instructor/Qualifier Guides completion, and job aids completion.

A critical part of this meeting is to establish that ownership of the Training Guide and how results from the EOM development will be used, reside with the ABU. Typically, the trainer(s) should accept primary responsibility for this, particularly the development of the Training and Qualification Plan (which will be contained in the Volume IV Training Guide) for the unit being analyzed.

It should also be noted that once the job analysis has been completed, the EOM developer should again meet with the ABU /section trainer to identify existing training material for tasks identified to be used in the manual. This will prevent the EOM developer from creating unnecessary training material later on in the analysis.

MEET WITH OPERATION'S CREWS

Before a job analysis is conducted, the task analyst, lead developer, and trainer(s) should meet with the Operation's crews and supervisors for the unit being analyzed. The key objectives of this meeting should be to:

- Introduce basic EOM development methodology.
- Gain crew support for the EOM development process.
- Discuss roles and responsibilities of SME's and explain crew reviews.

- Demonstrate how the EOM will function in the control room and at other computer terminal locations. Describe how the current work effort will produce a similar EOM for this unit.

- Present a preliminary schedule that shows milestones such as job analysis completion, procedure completion, OJT Instructor/Qualifier Guides completion, and job aids completion.

It is critical for the success of the EOM development effort that end users feel a sense of ownership of the process in order to ensure the resulting EOM is accepted and used to it's utmost potential.

Performing Job Analysis

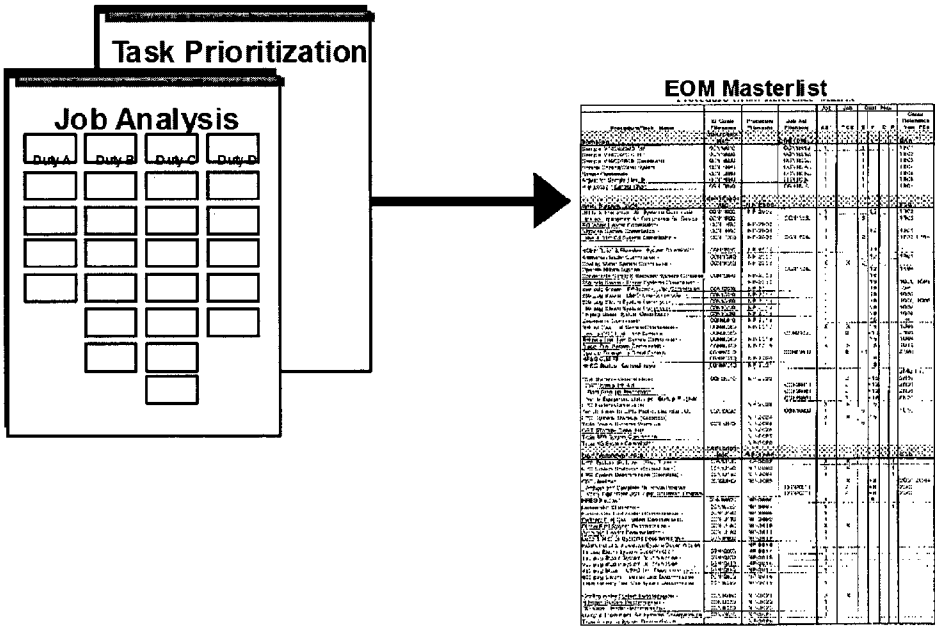


Figure 4.1 8 Job/Task Analysis and Master list

PURPOSE AND OBJECTIVES

This section defines job analysis and describes how the job analysis is performed. The job analysis is the first major data-gathering step in the EOM process. It is extremely valuable because it serves to:

- Help create a common understanding of the scope of work involved in a particular job in the refinery.
- Organize data about a job and shows how this data can be logically categorized.

- Identify relative importance of tasks and task priority by assigning a priority code based on both the criticality of the task and the frequency of its performance.
- Guide the development and modification of operating area business unit training and qualification plans that guide trainees through the scope and sequence of their on-the-job training. The training plan is developed by the trainer, shift supervisor, task analyst and lead developer.

Task analysts must become proficient at performing the job analysis. The results from this analysis set the stage for the remaining work associated with the EOM.

DEFINITION OF JOB ANALYSIS -

Job analysis is an operational description of a job that defines the job in terms of duties and tasks. It also organizes this information and prioritizes the tasks in terms of their relative criticality and their relative frequency. The job analysis is the first major part of a complete job task analysis. Steps for conducting a job analysis are illustrated in Figure 4.1-9 below.

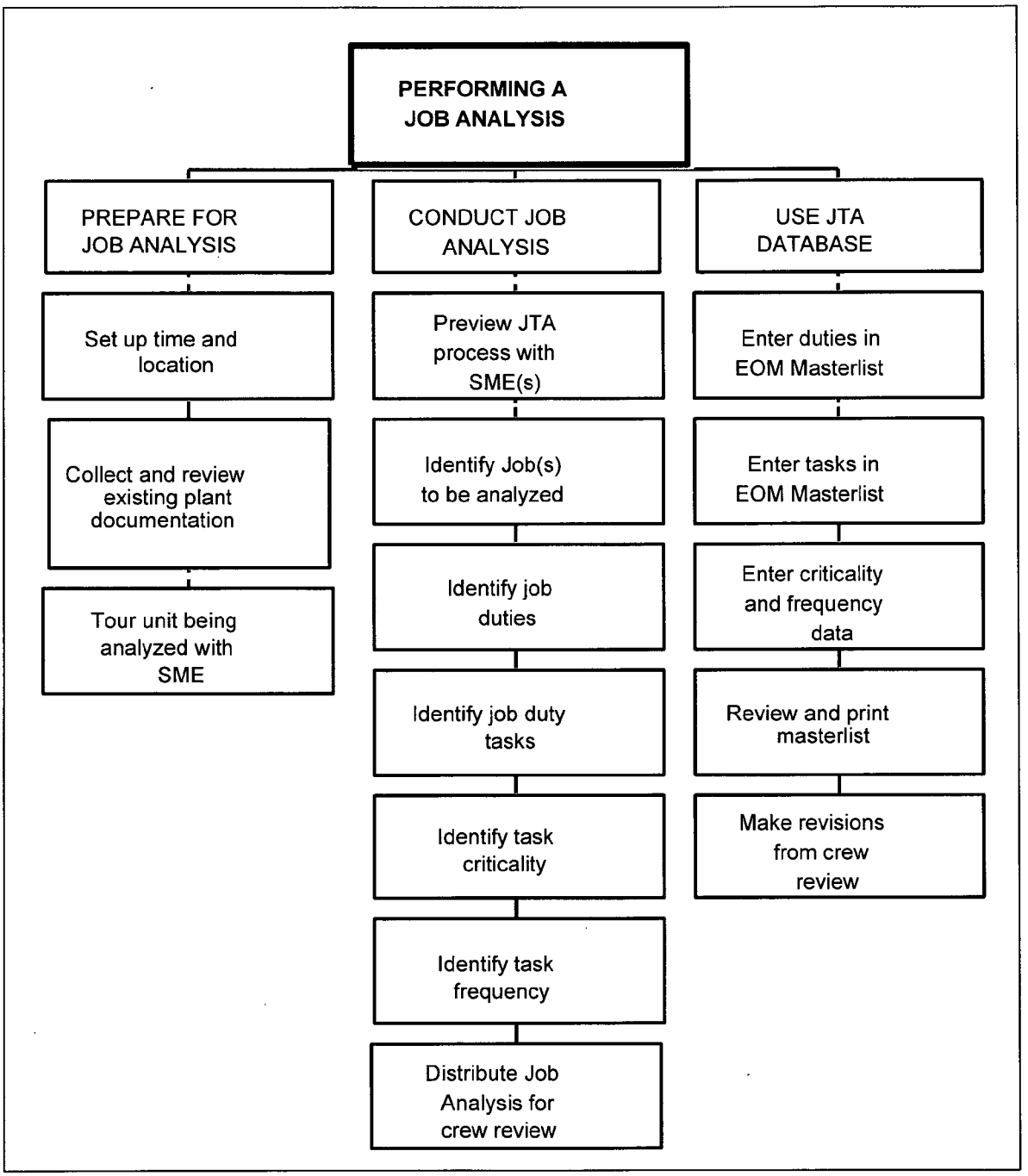


Figure 4.1-9 Job Analysis Flow Chart

A job analysis breaks up a job into duties and tasks. It can be used to:

- Provide a validated, operational description of the job.
- Logically organize a job or jobs.
- Prioritize tasks for training and qualification.
- Track progress toward qualification.
- Obtain performance data.

PREPARE FOR JOB ANALYSIS

As the first major part of the EOM process, the job analysis sets the stage for the development steps that follow. It is important to prepare thoroughly.

After you have familiarized the operating area business unit with the EOM development process, it should be clear which people will be involved from the area business unit and what constraints may exist on their time. It is important to respect these constraints and plan out the time and location for job analysis activities.

FRONT END ANALYSIS

The EOM developer should become familiar with the plant and the job positions being analyzed by collecting and reviewing all available material. Review the existing operating manual, process flow diagrams and any other available plant information. Pay particular attention to existing procedures and any information on routine duties. Collect any relevant material that is available from other refineries including operating manuals, job analysis and training materials. Contact the Best Practices Team process master for any information they may have on similar jobs or plants. It may also be helpful to make an initial listing for yourself of the names of the duties and tasks that are most frequently mentioned.

FRONT END ANALYSIS CHECKLIST

- Existing operating manual
- Process flow diagram
- Area startup and shutdown procedures
- Routine Duties list
- FEA from other refineries
- Information from Process Masters
- Operating manuals from similar plants in other refineries
- Refinery Instructions (safe work practices)
- Check the Worldview server for related materials
- MOC information
- HAZOP results
- Environmental Reference Manuals
- Manufacturers equipment information

Finally, make arrangements to tour the unit with one of the subject matter experts (SMEs). This type of "walk down" can be very helpful later when the SME is

describing tasks that are carried out. Pay attention to major equipment and operator work stations as you tour the unit.

CONDUCTING INTERVIEWS - SEE APPENDIX M

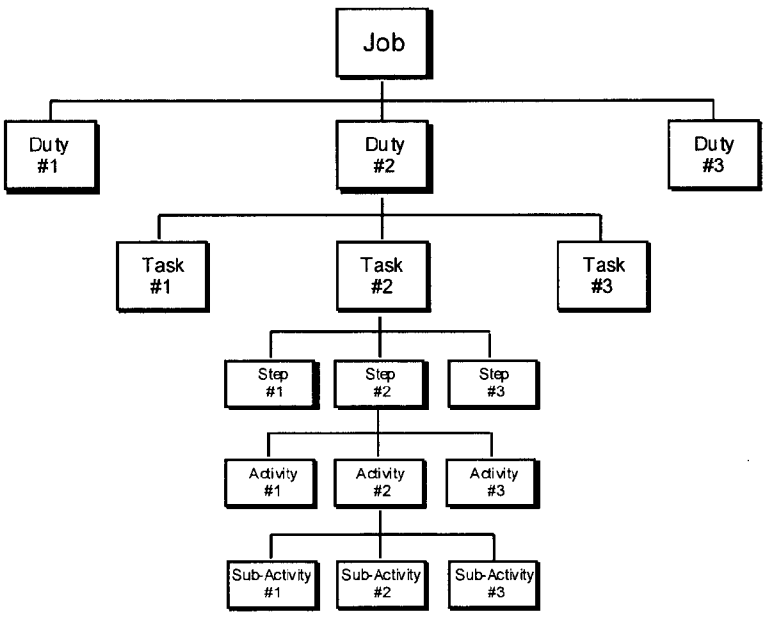
This appendix provides guidelines for conducting interviews with the SMEs.

CONDUCT JOB ANALYSIS

The job analysis is basically an interview session where each job is broken down into its major duties, and the duties are broken down into tasks. It is sometimes useful to think of the task names as corresponding to the names of procedures that either exist or might need to be developed (although this is not a hard and fast rule; sometimes several task names will end up comprising one procedure, and other times one task name will encompass several procedures).

This job/duty/task information is organized in a hierarchical manner such that the job is comprised of all the duties, and each duty is comprised of all the tasks assigned to it. Figures 4.1-10 through 4.1-12 illustrate the job analysis methodology.

Figure 4.1 10 Illustration of Job Analysis Hierarchy



Job: Usually the title of the job, e.g. Operator #1

Duty: A major part of the job, e.g. Make Batch

TASK: Lowest level of activity with a usable output, e.g. Add Cyclohexane to Reactor

Step: Each task is made up of a series of steps

Activity: A step may have several activities

Sub-activities: An acativity may have several sub-activities

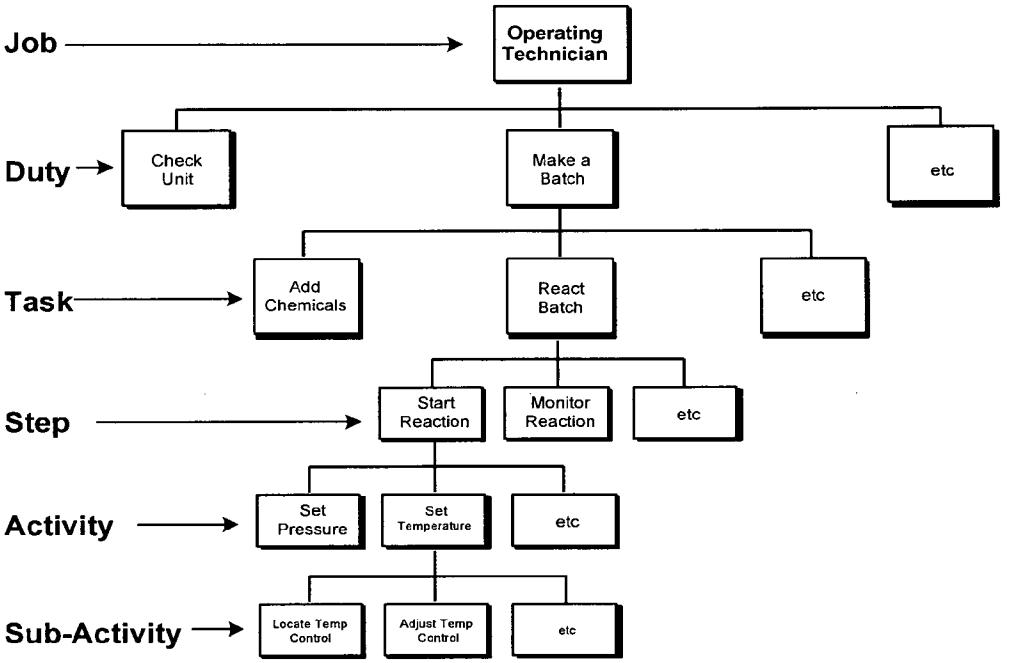


Figure 4.1 11 Example Job Analysis for a Batch Operating Technician

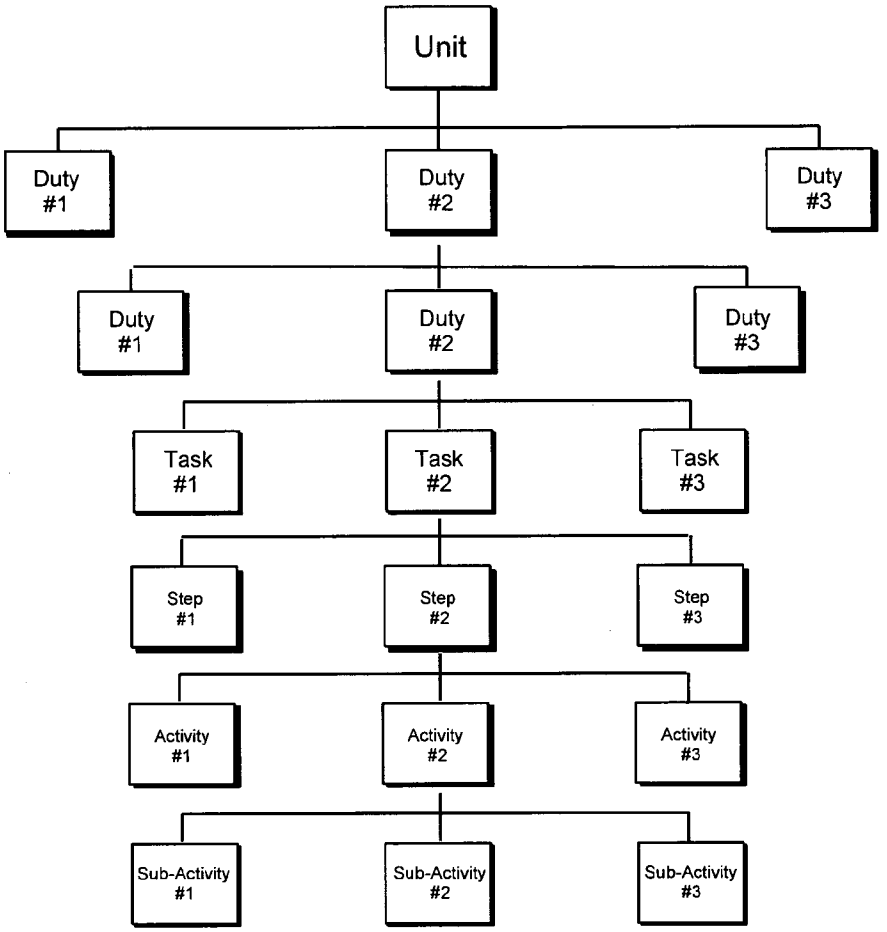


Figure 4.1 12 Expanded Hierarchy Illustration for the Jobs at a Unit

For each task, identification is made to characterize the criticality of the task and the frequency of performance. The priority code conventions for these are:

- CRITICALITY:
  - C = Critical
  - I = Important
  - L= Low Impact
- FREQUENCY
  - S = Seldom
  - R = Regular
  - O = Often

These priority code conventions will be useful for making decisions later on regarding the need for procedures and job aids. A weighting convention is also shown it Table 4.1 which can be helpful in making these decisions as well as in developing the relative priority of tasks. This information can also be useful in developing the priority of task training in the Training and Qualification Plans for the unit.

Table 4.1

Guidelines for Task Criticality and Frequency Characterizations

Characterization	Guidelines	Numerical Weighting
CRITICALITY		
C = Critical	If performed incorrectly, consequences could result in loss of life, injury to personnel, or intolerable economic penalty.	3
I = Important	If performed incorrectly, consequences would probably not cause personnel hazards or considerable economic loss, but some correction would likely be required.	2
L = Low Impact	If performed incorrectly, there is not much implication to health or economics.	1
FREQUENCY		
S = Seldom	Occurrence is not often, usually unpredictable.	3
R = Regular	Performed on a periodic basis, but less often than weekly.	2
O = Often	Performed frequently, at least weekly.	1

DOCUMENTING THE JOB ANALYSIS

The task analyst should perform the job analysis as early as possible in the work effort for an EOM. Initial agreement must be reached on the jobs applicable for the manual effort, and a job analysis completed for these job positions.

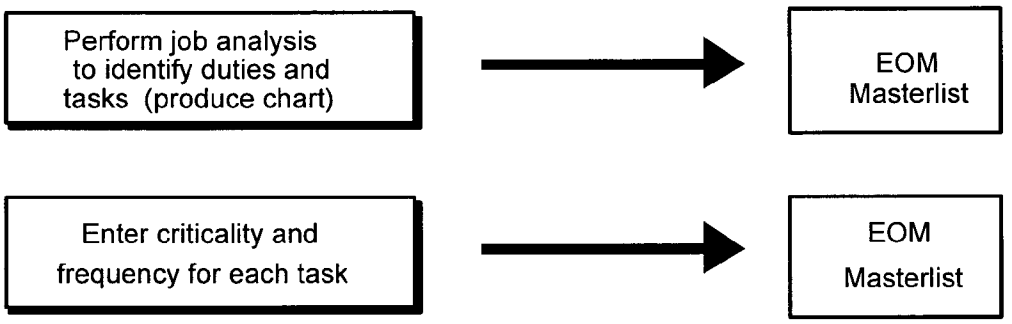


Figure 4.1 13 Analysis and Masterlist Flow Chart

Job analysis data is entered in the EOM Masterlist. This template is accessed on the EOM Development File Server. The duties and tasks are recorded for each job position. The criticality and frequency data are entered for each task.

4.5 Job Analysis Example for a Basic Refinery Operator

Consider a basic outside operator job position at the refinery. Some typical duties would include:

- Making rounds
- Performing routine duties
- Operating furnaces

Now consider the duty called "Making Rounds" and what an operator must do while making rounds; for example:

- Check plant for leaks
- Check equipment for proper operation
- Check equipment levels
- Check equipment pressures
- Check equipment temperatures

The job analysis for this is shown in Figure 4.1-14.

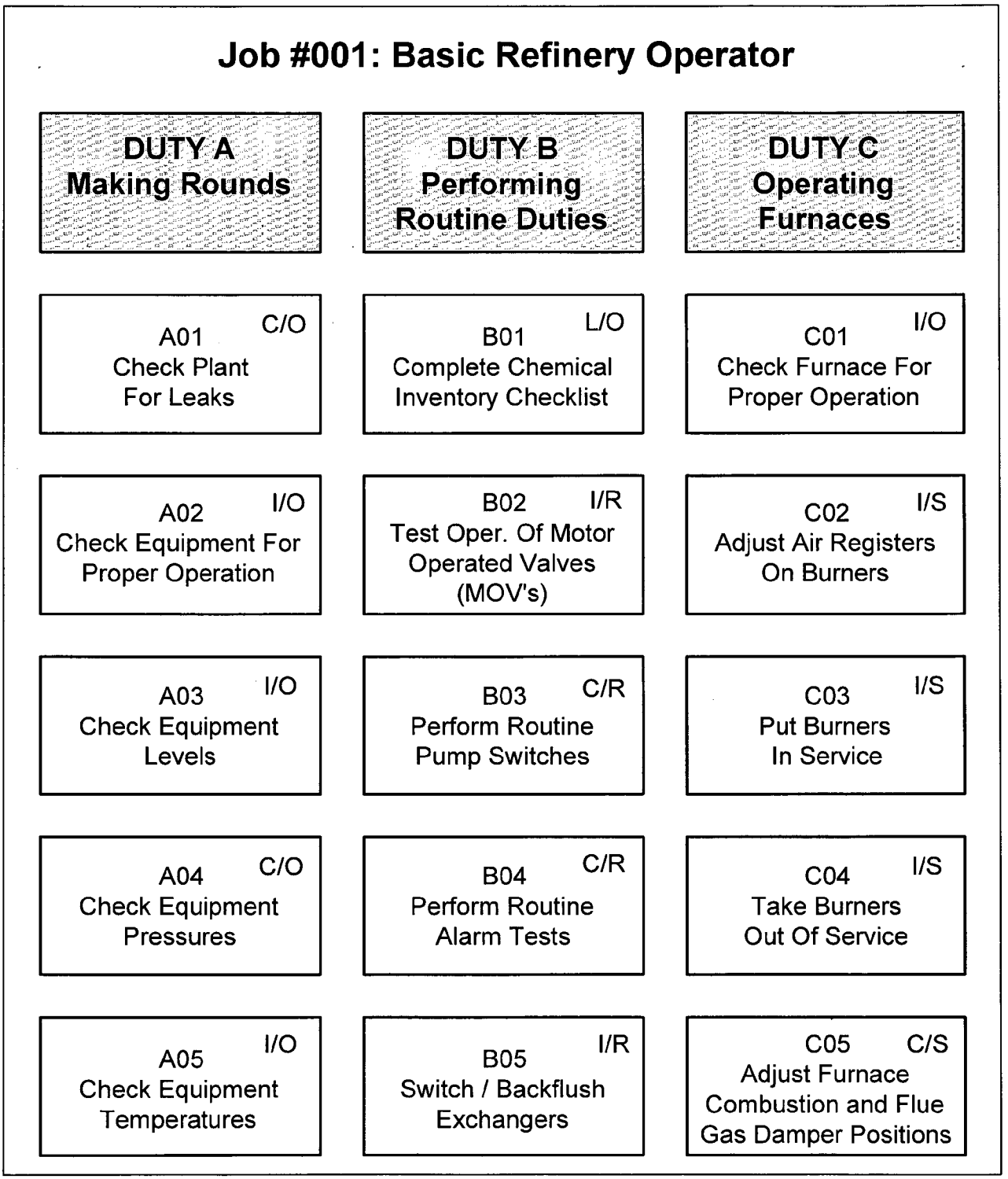


Figure 4.1 14 Sample Job analysis (partial) for a Basic Refinery Operator

Other Examples of Job Analysis Approach

There are several ways that the job analysis can be approached. The important thing is that all of the duties and all of the tasks are identified. A common approach at Chevron U.S.A. has been to start with the more general duties (such as communications, making plant inspection, taking readings, making rounds, etc.), then moving into the system related duties (such as operating the feed system, switching trains), and then into the component related duties (operating the furnace, operating the column, etc.).

Another approach is to organize the duties in the same order as is done for procedures in the EOM (Duty A = Initial Startup, 1000 Series; Duty B = Startup, 2000 Series; Duty C = Shutdown, 3000 Series; etc.).

Examples of different job analysis approaches for an operating unit outside operator job are shown on the following pages as follows:

- **Operating Unit Job Analysis #1.** Figure 4.1-15 thru 17 illustrates a job analysis approach, which starts with the more general duties and then tends to follow an equipment orientation for most of the remaining duties.

- **Operating Unit Job Analysis #2.** Figure 4.1-18 and 19 begins in a similar manner to Figure 4.1-15 but then follows more of a systems orientation.

- **Operating Unit Job Analysis #3.** Figure 4.1-20 is a completely different approach with organizes the duties in a manner similar to the procedures organizational strategy in the EOM.

All of these approaches are acceptable. The important thing is that the process is followed until all relevant duties and tasks have been identified, and that the organization of the information makes sense to the task analyst, the lead developer, and the area business unit/section trainer and SME's.

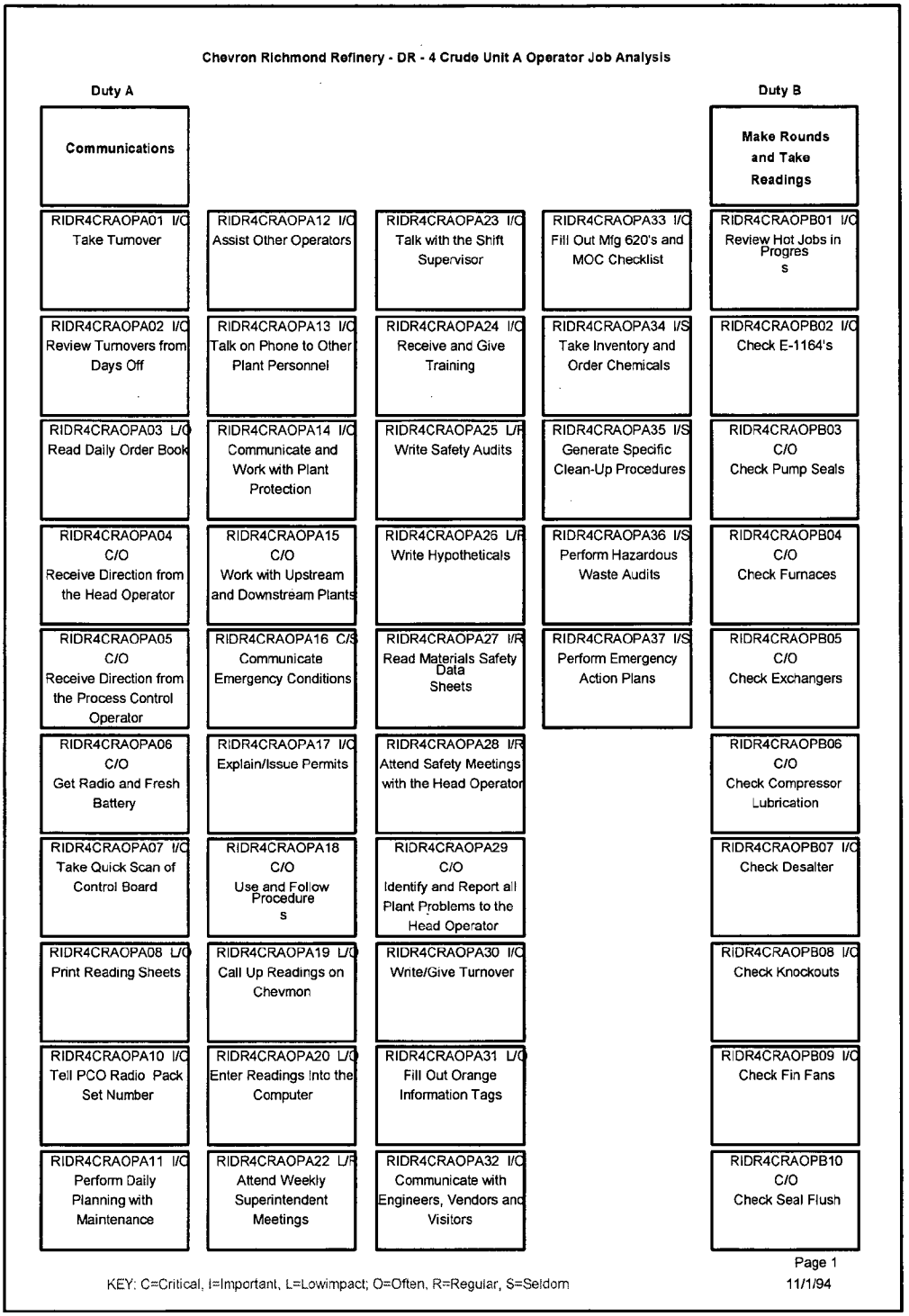
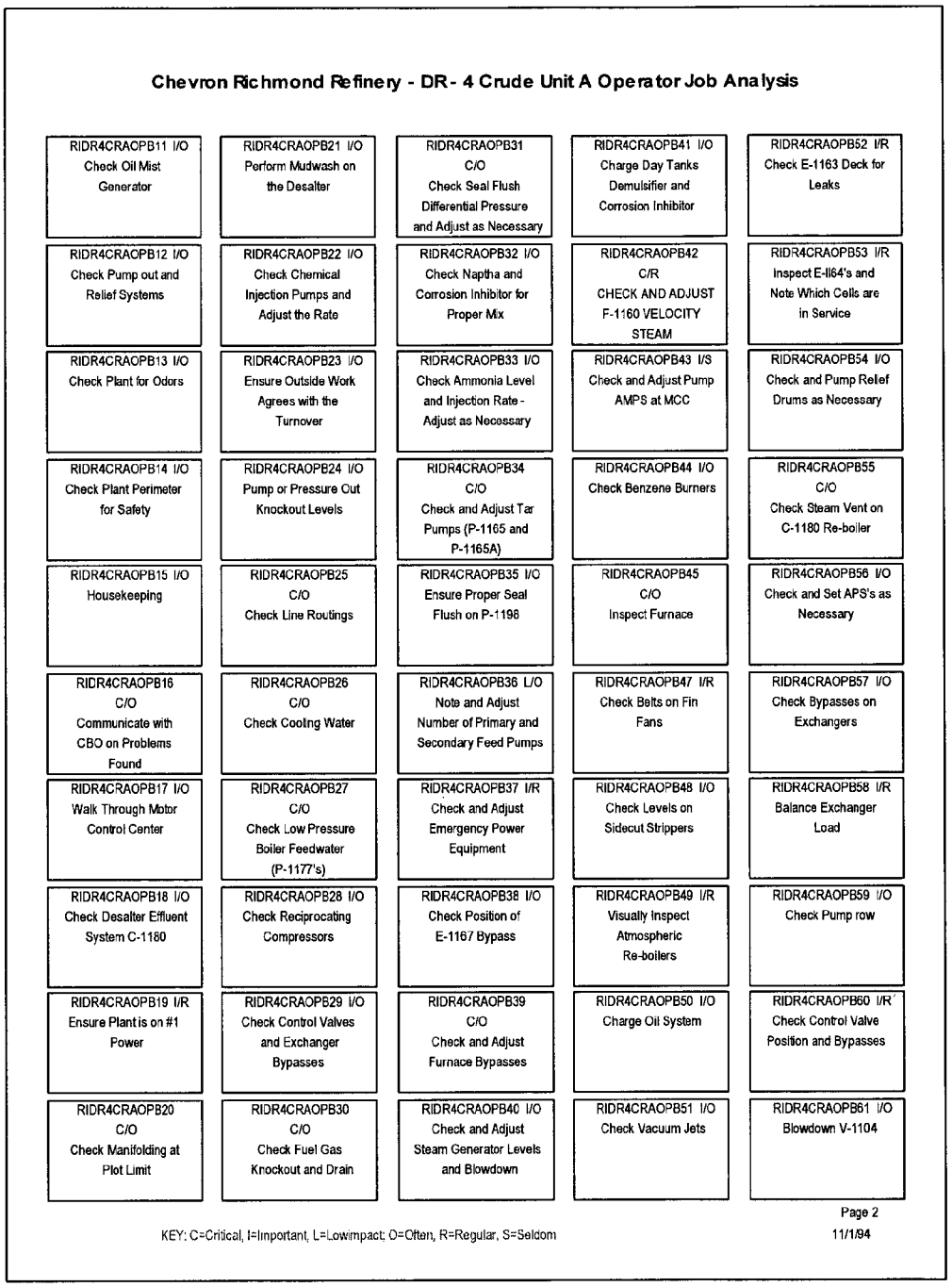


Figure 4.1 15 Sample Jog Analysis #1 for Operating Unit - From General Duties into an Equipment Oriented Approach (Page 1 or 3)



Chevron Richmond Refinery - DR- 4 Crude Unit A Operator Job Analysis

RIDR4CRAOPB11 I/O Check Oil Mist Generator	RIDR4CRAOPB21 I/O Perform Mudwash on the Desalter	RIDR4CRAOPB31 C/O Check Seal Flush Differential Pressure and Adjust as Necessary	RIDR4CRAOPB41 I/O Charge Day Tanks Demulsifier and Corrosion Inhibitor	RIDR4CRAOPB52 I/R Check E-1163 Deck for Leaks
RIDR4CRAOPB12 I/O Check Pump out and Relief Systems	RIDR4CRAOPB22 I/O Check Chemical Injection Pumps and Adjust the Rate	RIDR4CRAOPB32 I/O Check Naptha and Corrosion Inhibitor for Proper Mix	RIDR4CRAOPB42 C/R CHECK AND ADJUST F-1160 VELOCITY STEAM	RIDR4CRAOPB53 I/R Inspect E-li64's and Note Which Cells are in Service
RIDR4CRAOPB13 I/O Check Plant for Odors	RIDR4CRAOPB23 I/O Ensure Outside Work Agrees with the Turnover	RIDR4CRAOPB33 I/O Check Ammonia Level and Injection Rate - Adjust as Necessary	RIDR4CRAOPB43 I/S Check and Adjust Pump AMPS at MCC	RIDR4CRAOPB54 I/O Check and Pump Relief Drums as Necessary
RIDR4CRAOPB14 I/O Check Plant Perimeter for Safety	RIDR4CRAOPB24 I/O Pump or Pressure Cut Knockout Levels	RIDR4CRAOPB34 C/O Check and Adjust Tar Pumps (P-1165 and P-1165A)	RIDR4CRAOPB44 I/O Check Benzene Burners	RIDR4CRAOPB55 C/O Check Steam Vent on C-1180 Re-boiler
RIDR4CRAOPB15 I/O Housekeeping	RIDR4CRAOPB25 C/O Check Line Routings	RIDR4CRAOPB35 I/O Ensure Proper Seal Flush on P-1198	RIDR4CRAOPB45 C/O Inspect Furnace	RIDR4CRAOPB56 I/O Check and Set APS's as Necessary
RIDR4CRAOPB16 C/O Communicate with CBO on Problems Found	RIDR4CRAOPB26 C/O Check Cooling Water	RIDR4CRAOPB36 L/O Note and Adjust Number of Primary and Secondary Feed Pumps	RIDR4CRAOPB47 I/R Check Belts on Fin Fans	RIDR4CRAOPB57 I/O Check Bypasses on Exchangers
RIDR4CRAOPB17 I/O Walk Through Motor Control Center	RIDR4CRAOPB27 C/O Check Low Pressure Boiler Feedwater (P-1177's)	RIDR4CRAOPB37 I/R Check and Adjust Emergency Power Equipment	RIDR4CRAOPB48 I/O Check Levels on Sidecut Strippers	RIDR4CRAOPB58 I/R Balance Exchanger Load
RIDR4CRAOPB18 I/O Check Desalter Effluent System C-1180	RIDR4CRAOPB28 I/O Check Reciprocating Compressors	RIDR4CRAOPB38 I/O Check Position of E-1167 Bypass	RIDR4CRAOPB49 I/R Visually Inspect Atmospheric Re-boilers	RIDR4CRAOPB59 I/O Check Pump row
RIDR4CRAOPB19 I/R Ensure Plant is on #1 Power	RIDR4CRAOPB29 I/O Check Control Valves and Exchanger Bypasses	RIDR4CRAOPB39 C/O Check and Adjust Furnace Bypasses	RIDR4CRAOPB50 I/O Charge Oil System	RIDR4CRAOPB60 I/R Check Control Valve Position and Bypasses
RIDR4CRAOPB20 C/O Check Manifolding at Plot Limit	RIDR4CRAOPB30 C/O Check Fuel Gas Knockout and Drain	RIDR4CRAOPB40 I/O Check and Adjust Steam Generator Levels and Blowdown	RIDR4CRAOPB51 I/O Check Vacuum Jets	RIDR4CRAOPB61 I/O Blowdown V-1104

Page 2
11/1/94

KEY: C=Critical, I=Important, L=Lowimpact; O=Often, R=Regular, S=Seldom

Figure 4.1 16 Sample Job Analysis #1 for Operating Unit - From General Duties into an equipment Oriented Approach (Page 2 or 3)

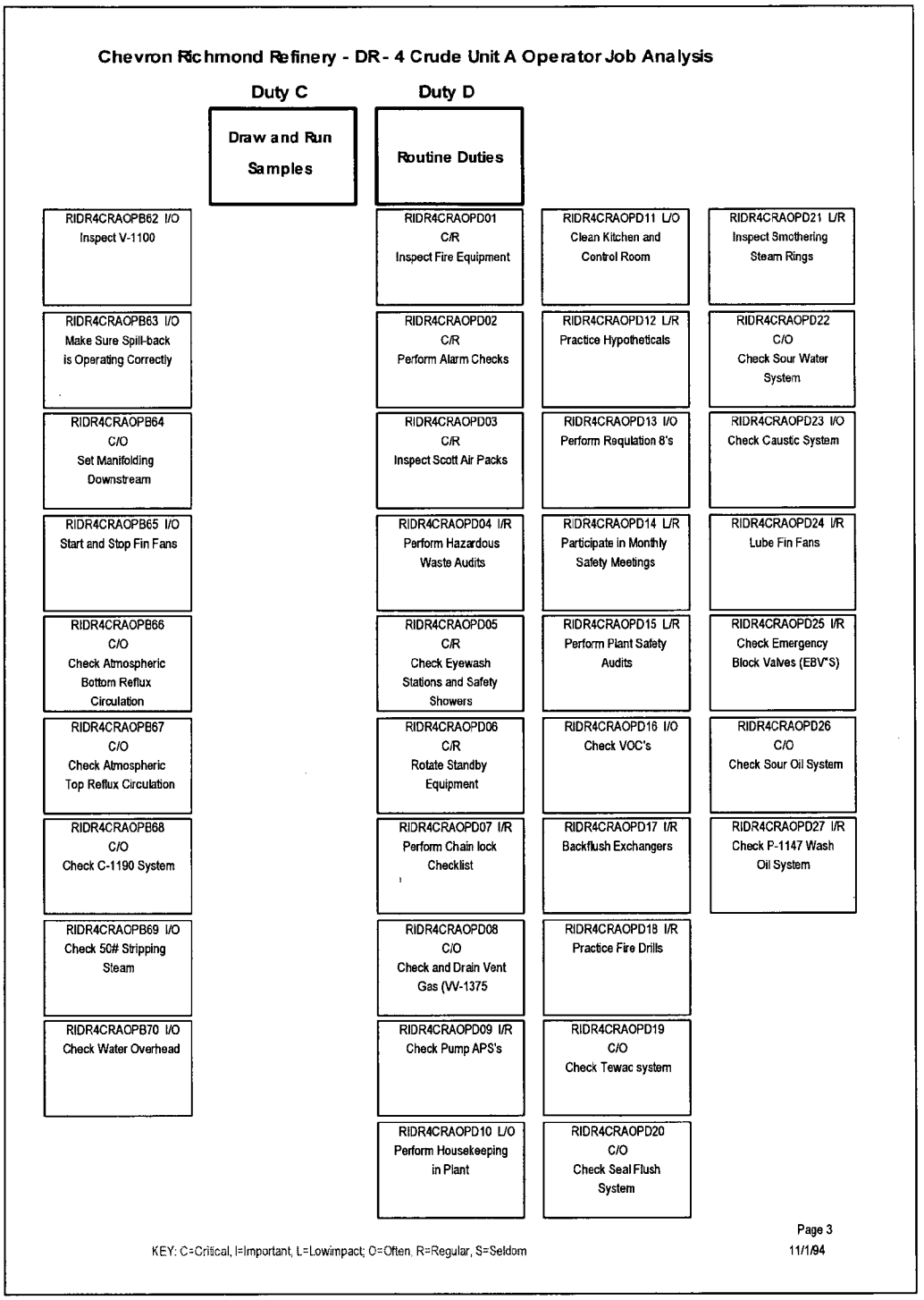


Figure 4.1 17 Sample Job Analysis #1 for Operating Unit - From General Duties into an Equipment Oriented Approach (Page 3 of 3).

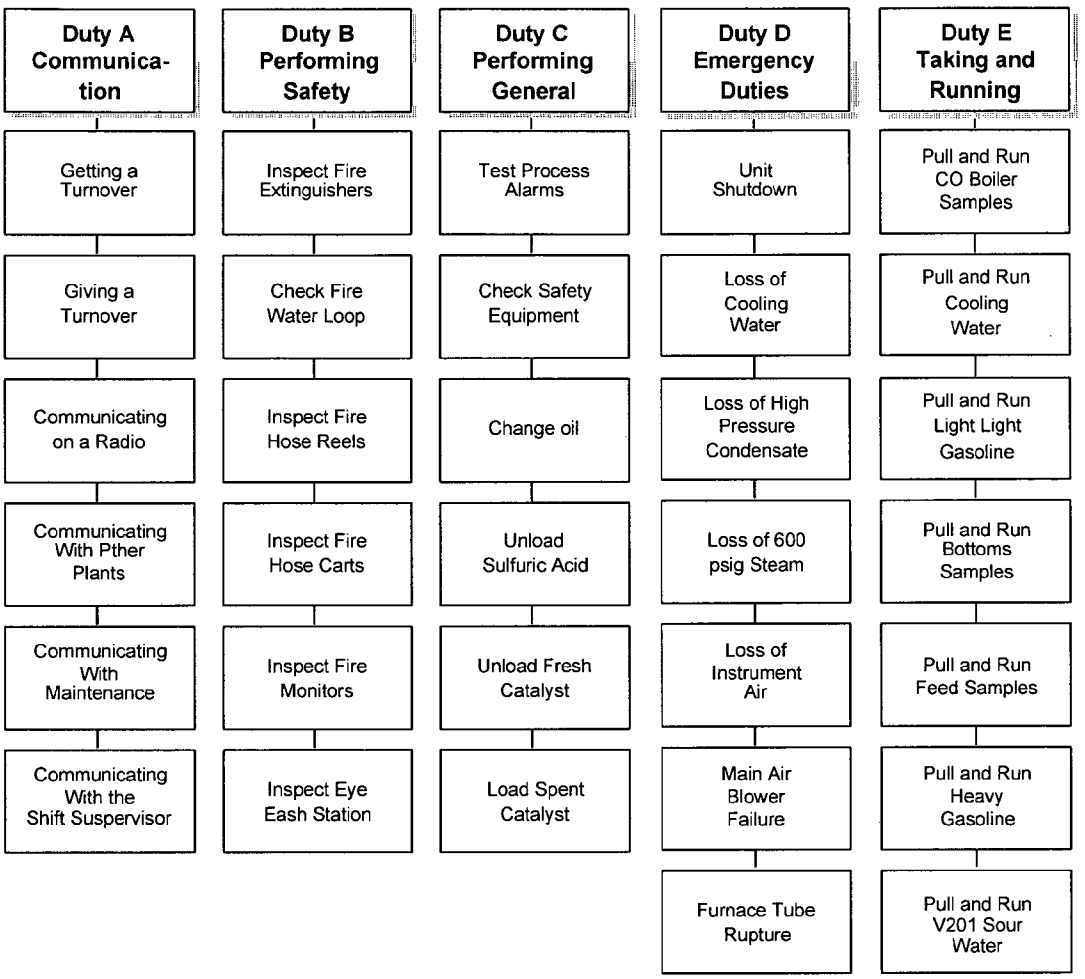


Figure 4.1 18 Sample Job Analysis #2 for Operating Unit - From General Duties into a Systems Oriented Approach (Page 1 of 2)

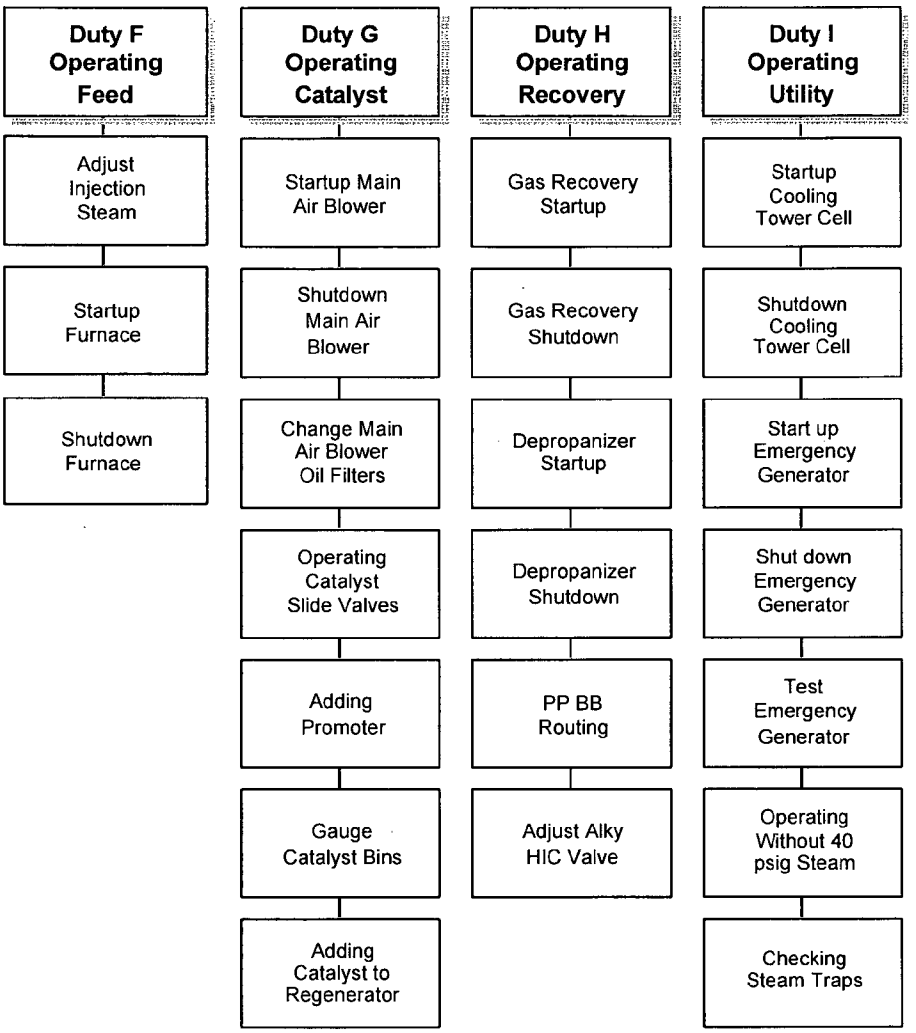


Figure 4.1 19 Sample Job Analysis #2 for Operating Unit - From General Duties into a Systems Oriented Approach (Page 2 of 2)

Duty A - **Initial Startup, 1000 Series Tasks**
1001, Procedure Name, Task Detail A001

Duty B - **Startup, 2000 Series Tasks**
2001, Startup Trains A/B, Task Detail B001
2002, Startup Train C, Task Detail B002
2003, Startup SWC, Task Detail B003

Duty D - **Reactor Related, 4000 Series Tasks***
4001, Procedure Name, Task Detail B001

Duty C - **Shutdown, 3000 Series Tasks**
3001, Shutdown Trains A/B, Task Detail C001
3002, Shutdown Trains C, Task Detail C002
3003, Shutdown SWC, Task Detail C003
3003, Shutdown SWC, Task Detail C003

Duty E - **Column Related, 4100 Series Tasks***
4101, Procedure Name, Task Detail B001

Duty F - **Vessel or Drum Related, 4200 Series Tasks***

Duty G - **Furnace Related, 4300 Series Tasks***

Duty H - **Pumps and Drivers Related, 4400 Series Tasks***

Duty I - **Exchangers/Coolers Related, 4500 Series Tasks***

Duty J - **Misc. Equipment Related, 4600 Series Tasks***

Duty K - **Routing and Flushing, 4700 Series Tasks***

Duty L - **Administrative, 4900 Series Tasks**

Duty M - **System Procedures, 5000 Series Tasks**

Duty N - **Alarm Response, 6000 Series Tasks**

Duty O - **Alarm Test, 7000 Series Tasks**

Duty P - **Routine Duties, 8000 Series Tasks**

Duty Q - **Temporary Procedures, 9000 Series Tasks**

Duty R - **Other Duties not mentioned above.**

Figure 4.1 20 Sample Job Analysis #3 for Operating Unit - Derived from the Procedure Grouping Logic of the EOM

4.6 Coordinating Job Analysis With Procedure Development Efforts

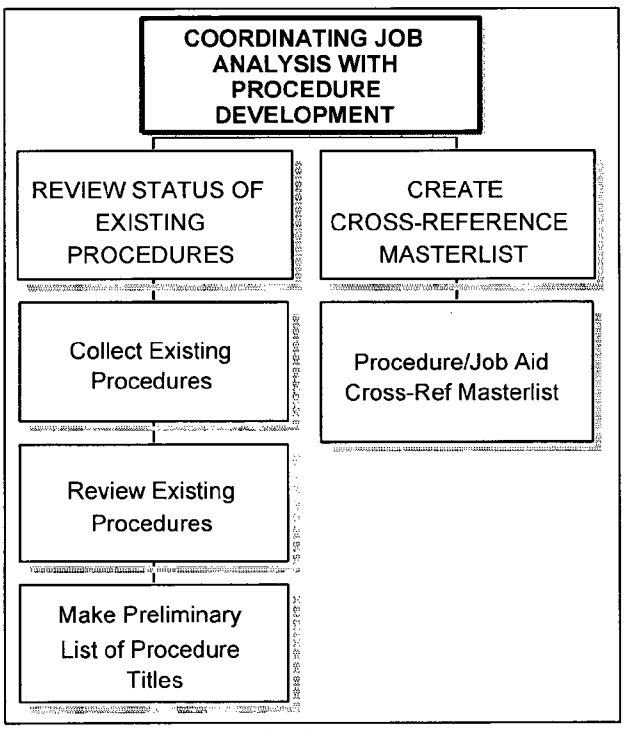
This section describes a task that should be performed shortly after the job analysis for a unit is completed and after the lead developer has had an opportunity to review the existing procedures for the unit. This task involves comparing these results and starting to coordinate the tasks identified in the job analysis with procedures that are already known to be needed. This information is input into the EOM Masterlist. It is valuable to perform this coordination because it serves to:

- Ensure the job analysis has addressed any tasks associated with known procedures.
- Identify where good information already exists, and thereby avoid performing unnecessary or redundant work.
- Build a good working relationship between the task analyst and the lead developer, and setting a delineation of responsibility for information needed to complete the EOM.

Definition of Coordination Task

The task analyst and the lead developer for the unit being analyzed must jointly perform coordination of the job analysis and the existing procedures. The major steps for this are illustrated in Figure 4.1-21 below.

Figure 4.1 21 Job Analysis/Procedures Coordination Steps



REVIEW STATUS OF EXISTING PROCEDURES

An early activity of the EOM effort is to collect the existing procedures for the unit, review them, and organize the material.

Existing procedures are reviewed to gain familiarity with the unit as well as to give insight on existing operation practices. These procedures are then compared to the task titles from the job analysis to draw preliminary links between the tasks and procedures. It is not unusual to find that one procedure (such as a startup) can cover several task details.

The task analyst and lead developer work together to develop an organized list of procedures and to finalize the job analysis. During this process procedures are identified from the task lists. There is not always a one-to-one correspondence between procedures and tasks. In general, there are four possibilities:

- A single task correlates to a single procedure.
- One or more tasks are combined and are covered under a single procedure.
- •A single task is broken down into two or more procedures.
- A single task has no procedure associated with it.

The most direct connection exists with the first case, i.e., when a single task correlates to a single procedure. A similar logic can be followed when developing the job analysis for a unit. Duties and tasks in the job analysis can be grouped in a manner that is consistent with the standard organization of the operating procedures.

Create Cross-Reference Matrices - The task analyst and lead developer for the operating manual should work together to develop a cross-reference listing of the task details and procedures they plan to create. Electronic tools are provided to help perform this. A matrix tool in Excel call the EOM Masterlist is provided to help create an initial list and establish source material relationships. This matrix tool is illustrated in Figure 4.5-2. It facilitates sorting and showing detailed relationships between procedures, task details and job aids Judgments will be needed on when to create procedures and when to create job aids. This process is helped by joint development of the cross-reference matrices covered in more detail in Section 8. General guidelines are:

- Written procedures must be developed for the highly critical tasks. This is consistent with the OSHA PSM requirements.
- Written procedures/job aids are needed when consequences of error are severe.
- Written procedures/job aids are needed when the task being performed is complex (large number of steps, or non-intuitive actions).
- Written procedures/job aids are needed when the task is infrequently performed and, therefore, more easily forgotten.

EOM Masterlist

Procedure/Job Aid Detail Cross-Reference Matrix

Procedure/Task Name	IQ Guide Filename	Procedure Filename	Job Aid Filename	Job A01	Job T02	Qual Plan S	F	O	R	Cross Reference from FEA
Sampling	CGN1D00Q. MAC		CGN1D00J.							B00
Sample V1600/2600 MP	CGN1B01Q.		CGN1B01J.	1		1				1B01
Sample V1500/2500 HP	CGN1B02Q.		CGN1B01J.	1		1				1B02
Sample V1800/2800 Deaearator	CGN1B03Q.		CGN1B03J.	1		1				1B03
Sample Cooling Water System	CGN1B04Q.		CGN1B04J.	1		1				1B04
Sample Condensate	CGN1B05Q.		CGN1B05J.	1		1				1B05
Adjust for Sample Results	CGN1B06Q.		CGN1B06J.	1		1				1B06
Plot Data on Control Chart	CGN1B07Q.		CGN1B07J.	1		1				1B07
Unit Startup 2000	CGN1F00Q. MAC	NP-2000								F00
Utility & Instrument Air Systems Commission -	CGN1N02Q.	NP-2002		1			13			1N02
Line up Emergency Air Compressor for Service	CGN1N02Q.		CGN1N03J	1		3				1N03
RO Water Header Commission-	CGN1L07Q	NP-2003								
Nitrogen System Commission -	CGN1J06Q	NP-2004		1			12			1J06
Lube & Mist Oil System Commission -	CGN1P03Q	NP-2005	CGN1P04J	1		2				1P03,1P04
HCBN Relief & Blowdown System Commission -	CGN1T01Q	NP-2006		1			14			1T01
Ammonia Header Commission -	CGN1R01Q	NP-2007		1			13			1R01
Cooling Water System Commission -	CGN1K01Q	NP-2008		X	X	2				
Operate Nitrate Syphon			CGN1K04J	1			12			1K04
Condensate Supply & Recovery Systems Commission	CGN1L04Q	NP-2009		1			16			
850 psig Steam - Steam Systems Commission -		NP-2010		1			19			1Q01, 1Q05
850 psig Steam - PP/Isomax Line Commission -	CGN1Q05Q	NP-2011		1			19			1Q05
850 psig Steam - LSFO Line Commission -	CGN1Q01Q	NP-2012		1			19			1Q05
500 psig Steam System Commission -	CGN1Q06Q	NP-2013		1			19			1Q06, 1Q02
150 psig Steam System Commission -	CGN1Q07Q	NP-2014		1			19			1Q07
15 psig Steam System Commission -	CGN1Q08Q	NP-2015		1			19			1Q08
Deaearator Commission -	CGN1L01Q	NP-2016		1			16			1L01
Natural Gas Fuel System Commission -	CGN1U06Q	NP-2017		X	X		15			1U06
Line up CGT Fuel Firing Systems	CGN2N03Q		CGN2N03J		2		-13			2N03
Refinery Fuel Gas System Commission -	CGN1U04Q	NP-2018		1			15			1U04
Diesel Fuel System Commission -	CGN1U12Q	NP-2019		X	X		15			1U12
Operate Emergency Diesel System	CGN2M01Q		CGN2M01J		2	-3				2M01
HRSG Cold Fill -	CGN1M05Q	NP-2020		1			18			
HRSG Startup - General steps:	CGN1M06Q	NP-2021		1			18			
CGT Startup - General steps:	CGN2N01Q	NP-2022			2		-12			2N02 thru 2N08
CGT Startup Job Aid			CGN2N01J		2		-12			2N01
Final Start up Preparation			CGN2N06J		2		-12			2N06
Verify Equipment status per Startup Program			CGN2N08J		2		-12			2N08
LPG System Commission -		NP-2023		X	X		15			
Set Up Lines for LPG Recirculation/Start Up	CGN1U02Q		CGN1U02J	1		5				1U02
LPG System Start-up (Vaporizer) -		NP-2024		X	X		15			
Train Steam Systems Warm-Up	CGN1Q14Q	NP-2025		1		9				
CGT STartup- Diesel Fuel		NP-2026								
Train RFG System Commission		NP-2027								
Train NG System Commission		NP-2028								
Unit Shutdown 3000	CGN1G00Q. MAC	NP-3000								G00
LPG System Shutdown (First Train) -	CGN1U13Q	NP-3002		X	X				1	
LPG System Shutdown (Second Train) -	CGN1U14Q	NP-3003		X	X				1	
LPG System Decommission (Complete) -	CGN1U15Q	NP-3004		1					1	
CGT Shutdown:	CGN2O01Q	NP-3005			X		-8			2O01-2O04
Activate and Complete Shutdown Program			CGN2O02J		2		-8			2O02
Verify Equipment Status per Shutdown Program			CGN2O03J		2		-8			2O03
HRSG Shutdown:	CGN1M07Q	NP-3006		1			8			
Deaearator Shutdown -	CGN1L08Q	NP-3007		1					1	
Natural Gas Fuel System Decommission -	CGN1U16Q	NP-3008		1						
Refinery Fuel Gas System Decommission -	CGN1U17Q	NP-3009		1						
Diesel Fuel System Decommission -	CGN1U18Q	NP-3010		X	X					
Ammonia Header Decommission -	CGN1U19Q	NP-3011		1						
Lube & Mist Oil Systems Decommission -	CGN1P06Q	NP-3012		1						
HCBN Relief & Blowdown System Decommission -		NP-3013								
15 psig Steam System Decommission -	CGN1Q09Q	NP-3014		1						
150 psig Steam System Decommission -	CGN1Q10Q	NP-3015		1						
500 psig Steam System Decommission -	CGN1Q11Q	NP-3016		1						
850 psig Steam - LSFO Line Decommission -	CGN1Q12Q	NP-3017		1						
850 psig Steam - Isomax Line Decommission -	CGN1Q13Q	NP-3018								
Train Refinery Fuel Gas System Decommision	CGN1L08Q	NP-3019		1						
Cooling Water System Decommission -	CGN1K05Q	NP-3021		X	X					
Nitrogen System Decommission -	CGN1J07Q	NP-3022		1						
RO Water Header Decommission -	CGN1L08Q	NP-3023		1						
Utility & Instrument Air Systems Decommission -	CGN1N04Q	NP-3024		1						
Train Ammonia System Decommission		NP-3025								

Figure 4.1 22 EOM Masterlist

The sorting feature of Excel allows data in the Figure 4.1-22 cross-reference matrix to be sorted several ways. The task analysis task detail number can sort the data. This view of the data easily shows those cases where one job aid is related to multiple procedures. Procedure number can also sort the same data. This view of the data easily shows those cases where one procedure is related to multiple job aids.

Other sorts can be made, such as:

- Sort on the job aid decision column to create a list of job aids sorted by "Yes," "No," or decision not made yet.
- Sort on job aid type to group together the various kinds of job aids, such as "photo location job aids."
- Sort on the training module number in solo, final, ongoing or refresher to group by the training sequence.

4.7 Creating Task Details

Task details are information collected on how things get done. As the name implies, they are intended to be as detailed as necessary to convey this information to someone else who does not know "how things get done" for this task. In the most common approach to capture this information, task details are step-by-step procedures written about the task in question. Task details are:

- Collected by a task analyst or lead developer working with subject matter experts (SMEs).
- Electronically captured on a Word document to record the details of how job tasks are performed.
- Reviewed for accuracy, completeness, safety, environmental and technical assurance.
- Used as the basis for procedures, training materials and performance improvement.
- Saved for future analysis and use.

The steps for developing task details are illustrated in Figure 4.1-23 below:

1. **PLAN**
   - Identify tasks of interest from the job analysis
   - Schedule SME(s) for interview
   - Prepare tools for conducting interview

2. **CONDUCT INTERVIEW**
   - Explain roles and the process
   - Establish relationship and working style
   - Obtain information to define the task
   - Build trust and confidence in the results of the task analysis

3. **RECORD, ORGANIZE, AND REFINE DATA**
   - Record task details using electronic tools
   - Confirm decisions made earlier on organization of data
   - Review with lead developer for the operating procedures
   - Modify procedures/task detail cross reference matrix as needed

4. **CONDUCT INDEPENDENT REVIEW**
   - Schedule a second SME for review
   - Incorporate comments

5. **FINALIZE TASK DETAILS AND MAKE AVAILABLE**
   - Complete analysis
   - Identify links to procedures
   - Make data available to lead developer for procedures
   - Ensure task details are saved for archiving purposes

Figure 4.1 23 Steps for Capturing Task Details

Past experience indicates each individual will develop their own style for collecting the original raw data for task details. Some methods people have used are:

- Paper and pencil
- Flip charts (sometimes combined with the yellow sticky method)
- Electronic white boards (which can produce paper copies before erasing)
- Data entry directly into a computer
- Computer data entry enhanced by use of a screen projection device
- Any of the above techniques enhanced by use of a tape recorder

Task details should also be annotated with supplemental information. These data are often **not** best presented as part of a procedural step. The computer tools accommodate this need by providing special formats for notes, cautions and warnings.

NOTES

Notes give additional information on a relevant subject. They are used to provide useful information just prior to performing associated steps.

CAUTIONS

Cautions advise that failure to perform the indicated action correctly could result in damage to the equipment. It is used to convey information on the consequences of deviations just prior to the performance of the associated task.

WARNINGS

Warnings advise that failure to perform the indicated action correctly could result in injury or potential hazards to personnel or impact the environment. It is used to convey information on the consequences of deviations just prior to performing the associated task. Definitions for the action verbs used in procedures have been established. **See definitions for action verbs in Appendix C.**

USE COMPUTER TOOLS FOR TASK DETAILS, KNOWLEDGE AND SKILLS

The task details must ultimately end up in a computerized format. This allows them to be used directly in the creation of procedures, job aids, and other training materials. It also provides a mechanism to archive task detail information for future use. When the task analyst is proficient in computer data entry, it can be very efficient to simply enter task detail information directly into the computer from the outset.

The Microsoft Word template is a fast tool for collecting data during interviews. The Word template for task details also has the advantage of being directly compatible with other Word templates that are used to create procedures for the EOM project. Task details are collected and organized in special Microsoft Word templates created for this purpose. Task detail Word files must be carefully named and managed so the data can be easily located in the future.

ELECTRONIC FILE NAMING CONVENTION

A considerable amount of data will be collected during the EOM development process. An alphanumeric numbering convention has been established to label the information and to keep it well organized. This convention is critical for organizing and archiving the information and makes it much easier to find data needed for later analysis and development.

The same alphanumeric convention is used in the EOM Masterlist as in the Microsoft Word Task Detail template, and the other EOM templates and final products of the JTA used in the EOM. The convention is:

UUUJDTT where:	
UUU = Unit Identifier	(e.g. 4CU = #4 Crude Unit)
J = Job Number	(e.g. 001 = Outside Operator)
D = Duty Identifier	(e.g. L = Operating Product Manifold)
TT = Task Number	(e.g. 12 = Route Gas Oil to Plant #27)

A header block appears at the top of the page for documents created from the JTA.

DETAILS FOR DEVELOPING VOLUME I - PROCESS AND EQUIPMENT DESCRIPTION

This chapter provides guidance for writing the Process and Equipment Description manual, Volume I.

This section provides greater detail about organization and content. Examples are provided. This information will simplify the creation process for Volume I.

5.1 Use of Process and Equipment Description

The Process and Equipment Description manual addresses the major topics of interest to operations and is designed to serve as a single reference source for the unit. It includes process discussion, equipment discussion, and other sections needed to supplement operator training.

This volume is intended to be maintained on the unit as a handy reference and also to be a companion to operator training. Since the volume is intended for operators, it will not address all engineering information, but only that information needed to understand why the unit operates as it does. For complex units, the volume also cannot discuss all possible nuances in operation. To keep the volume as a usable document, some of that information needs to be left for on-the-job training.

5.2 Volume I Content Guidelines

The Process and Equipment Description volume is divided into seven chapters, Front Matter, and one or more appendices.

- Front Matter
- 1. Introduction
- 2. Process Information
- 3. Safety Information
- 4. Environmental
- 5. Normal Operations
- 6. Equipment Description
- 7. Utilities

Each of these chapters is required in the electronic operating manuals for process units. It is recognized that variations from this model may be needed for non-process units.

Each chapter and section of Volume I is discussed below. For some units, the content or the order of the subjects will need to be adjusted to fit the specifics of the unit. In any case, throughout the

discussion that follows, guidelines are provided that should be useful in developing any unit's descriptive manual.

NOTE: The following sections make reference to YOUR unit. This is intended as a reminder that each of these sections are specific for the unit you are writing about. YOUR is all capital letters for emphasis.

FRONT MATTER

The Front Matter provides an introduction to the operating manual system. At a minimum, it has a purpose statement, instructions on how to use the manual, a revision summary page, and a table of contents.

Purpose. The Purpose section provides a general overview of the operating manual system and describes how the manuals fit into the system of manuals for YOUR unit.

How to Use This Manual. This section describes the structure of the manuals (volumes) and briefly summarizes the information in each volume.

Revision Summary. Rev. A, B, C, is used during drafting and review. Generally three revision drafts complete the ABC Review Process before first WEB posting. Rev. 0, month/year is used for initial issue, followed by Rev. 1, 2, etc. as changes are required per MOC.

Table of Contents. The table of contents is built from styles in the documents and from the outline prepared during planning and is finalized as a last step.

1. INTRODUCTION

The generic Introduction Chapter is available as a link. All plants link to this information, which provides the reader with a general overview and understanding of the basic function performed by the unit as a portion of the overall refinery system. The information provides a basic understanding of why the unit exists, how the unit relates to overall refinery operations, and what processes take place within the unit. The following sections are described:

- Purpose of the Descriptive Volume
- Organization of the Volume
- Purpose of the Unit
- General Nomenclature
- List of Reference Material

Purpose of the descriptive volume. Briefly discuss the purpose of the volume as the main, basic reference source for YOUR unit. Identify limitations in its use if any.

Organization of the volume. Identify the chapter titles to provide the reader with an overview of volume content.

Purpose of the unit. This section provides information to help the reader visualize the function of YOUR unit from a refinery-level perspective. Briefly identify its relation to other upstream and downstream units, feed sources, process streams, and product streams.

General nomenclature. Provide a summary of the types of nomenclature used on YOUR unit and in the manual. Include equipment names and numbering, instrumentation numbering, and procedure numbering. Generally, save any discussion of acronyms and abbreviations for the appropriate appendix.

List of Reference Material. Provide a list of other reference material available to the operator for additional information. Figure 5-1, Rules for Introduction Chapter, summarizes some basic rules that will simplify drafting of this chapter.

- Use the Introduction Chapter to orient the reader to the position YOUR unit has in the entire refinery system.
- Provide overview-level information. Save additional detail for the later chapter on each subject.
- Discuss each required topic.

Figure 5-1. Rules for Introduction Chapter

2. Process Information

The Process Information Chapter provides the reader with a detailed understanding of the process that occurs in YOUR unit. It is recommended that this chapter include a system overview or simplified process flow diagram or an appropriate substitute. Feed sources, product streams, and inter-unit effects are each addressed separately. Guidelines are provided below which will apply for most (but not all) of the units.

Chapter 2 will generally contain the following sections:

- History of Upgrades/Modifications to the Unit
- Process Overview
- Process Streams
- Feed Sources
- Product Streams
- Process Chemistry
- Integrated Operations
- Economics
- Physical and P&ID Diagrams

Although the order above is recommended, the order may be changed, sections deleted if not applicable, or other sections added if needed to properly address YOUR unit.

History of upgrades/modifications to the unit. Provide a brief description of the upgrades/modifications (date, modification, reason) for YOUR unit. You may also want to include the reason your unit was originally built. Include the initial startup date if you have it since it can impact grandfathering of certain regulations.

Process overview. Provide an overview of unit operation, feed sources, process streams, and product streams. Use the system process flow diagram to help the reader understand the information.

Process streams. Provide in-depth information concerning the process in YOUR unit. Discuss the process component-by-component or system-by-system. Include equipment, temperatures, pressures, flows, etc. as appropriate.

Feed sources. Describe the feed sources to YOUR unit and the general characteristics of these sources. For brevity, it is suggested that you discuss only the sources for the most common mode(s) of operation. Discuss how quality or quantity of feed impacts YOUR unit. Use tables as needed to summarize feed information.

Product streams. Identify all products of YOUR unit. Discuss destinations of each product and how unit operation affects the product(s) being made. Use tables to summarize product characteristics.

Process chemistry. Discuss the chemistry involved in unit operations. Discuss by component or system if applicable to YOUR unit. Cover the following topics: Process Chemistry for Primary Reactions, Process Chemistry for Side Reactions, Potential Reaction Hazards. Graphics are recommended to facilitate the discussion Typical process chemistry topics include:

Alkylation	Steam Stripping
Distillation	Hydrotreating
Catalytic Cracking	Deasphalting
Flexicoking	Desalting
Gas Treating	Blending

Integrated operations. Provide the reader with an understanding of how YOUR unit may affect other units and how other units affect YOUR unit.

Economics. Provide the reader with a basic understanding of how efficient or inefficient unit operation can affect refinery costs.

Physical and P&ID diagrams. List the physical diagrams (plot plans) and Piping and Instrument Diagrams (P&IDs) most often referenced by YOUR unit operators. If the needed diagrams do not exist or are out of date, coordinate with your PSM and engineering departments so they

are aware of this. Also include a list of the Process Flow Diagrams (PFDs) listed in the 'Red Book' and the appropriate electrical classifications.

Figure 5-2, Rules for Process Information Chapter, summarizes guidance.

- Process Information should be written based on a flow diagram of the unit. Identify or create this diagram and relate all discussion in the chapter to it.
- YOUR unit, and the unit diagram, should be divided into components or subsystems RELATED TO HOW THE OPERATORS VISUALIZE THE UNIT.
- Creating simple flow diagrams for each subsystem, and including these in Chapter 1 saves long, wordy explanations, and enhances user-friendliness.
- The discussion of process streams is likely to be one of the longest sections in the manual for MOST units.
- Provide a separate discussion (may be multiple paragraphs) for each feed source and product stream.
- Discuss process chemistry AFTER discussing the process streams, feed sources, and product streams. Relate specific chemical reactions to specific components or systems.

Figure 5-2. Rules for Process Information Chapter

3. Safety Information

The Safety Information Chapter provides the reader with information related to safety issues on YOUR unit. Although this chapter does include some general refinery safety information, it IS NOT intended to repeat all the information that may be in the refinery Safety Manual. The chapter includes information about personnel safety as well as about safety devices installed on YOUR unit.

Chapter 3 must address the following subjects:

- Safety Responsibilities
- Process Safety Management (PSM) Overview
- Potential Unit Hazards
- Personnel Safety Issues
- Unit Safety Systems and Devices
- Fire Protection Equipment
- Failure Prevention

Safety responsibilities. Discuss the responsibilities for all employees concerning safety. Refer to refinery safety requirements and any guidelines specific to YOUR unit.

Process Safety Management (PSM) overview. Provide a discussion of OSHA 29 CFR 1910.119, Process Safety Management of Highly Hazardous Chemicals

Potential unit hazards. Identify the location of each potentially hazardous material present or created on YOUR unit. Discuss important information about each material. Discuss Material Safety Data Sheets and their location. Table 5-1, Sample Hazardous Material Table, is an example of a table for this purpose.

Table 5-1. Sample Hazardous Material

UNIT HAZARD	LOCATION	IMPORTANT INFORMATION
Hydrogen Sulfide (H_2S) / Acid Gas	This lethal compound exists in processes throughout the xxx Unit.	• Procedures for safe handling are provided in ... • The H_2S Detection System is described in ... • Immediate actions during an emergency involving H_2S are described in ...
Other Hazardous Compounds	Location by component or system	• All operations personnel should be completely familiar with the information provided in ...

Personnel safety issues. Describe the personnel protective measures that need to be taken on YOUR unit. Usually this will include color coding of equipment, general safety rules, and personal safety equipment used on the unit.

Unit safety systems and devices. Identify systems and devices used on YOUR unit. Identify and discuss the following or additional items as appropriate:

- Control Valve Fail Action List
- Safety Critical Devices
- Critical Alarms
- Interlocks
- Remote Board Operator Switches
- Pressure Relief Devices
- Hazardous Gas Analyzers (H_2S)
- Isolation Motor Operated Valves (MOVs) and Chopper Valves
- Furnace Isolation Manifold
- Ventilation systems

Critical alarms are alarms that are required for the safe operation of the plant. The pressure relief device matrix must include relieved equipment, type of device, tag number, set pressure, and frequency of testing. When discussing pressure relief systems, include a statement such as "the relief system was designed to handle the entire flow in the unit in the case of an extreme emergency." Note that this statement will need to be supported by design data (this design data does not go in the EOM; it is maintained by the engineering department). Ventilation system descriptions are needed for control rooms and laboratories.

Fire protection equipment. Identify quantities and types of fire protection equipment on YOUR unit. If the plot plan shows where the fire and safety equipment is located, put the plot plan under the P&ID button and also establish a hot link from this section to the plot plan. If the plot plan does not have this safety critical information, inform the appropriate PSM coordinator. Until the plot plan is updated, use tables to identify the location of fire protection equipment as needed.

Failure prevention. Identify specific concerns that may cause failure of YOUR unit. Discuss the preventive measures for important concerns.

Figure 5-3, Rules for Safety Information Chapter, provides some important information related to writing this chapter.

- Much of the information in this chapter is related to meeting OSHA requirements. All topics MUST BE ADDRESSED in the manual.
- Information on Unit Hazards should summarize, not repeat, information in the refinery MSDSs.
- Information on personal safety equipment, unit safety systems and devices, and fire protection equipment should be specific to YOUR unit and should provide location whenever possible. Consider using tables extensively for this purpose.

Figure 5-3. Rules for Safety Information Chapter

4. Environmental Information

The Environmental Information Chapter provides the reader with information related to environmental issues on YOUR unit. It is intended to identify and summarize environmental concerns that the operator can impact. For example, although design issues may need to be briefly discussed to provide the operator with an understanding of why YOUR unit operates as it does, they should not be discussed in detail since the operator cannot change them. Operating parameters and issues are the important part of this chapter which should include at least the following sections:

- Environmental Philosophy
- Odor
- Air
- Noise
- Water

Environmental philosophy. Discuss ChevronTexaco's commitment to safeguard public health and the physical environment. Provide general discussions of employee environmental responsibility, emergency response, and laws and regulations.

Odor. Discuss the systems and procedures on YOUR unit for controlling release of odors into the environment.

Air. Discuss the systems and procedures on YOUR unit for controlling impact on air quality.

Noise. Discuss the systems and procedures on YOUR unit for controlling noise.

Water. Discuss the systems and procedures on YOUR unit for minimizing process water exiting the unit, and capturing/cleaning of contaminated water.

Figure 5-4, Rules for Environmental Information Chapter, provides guidance for developing this chapter.

- Much of the information in this chapter is related to meeting OSHA requirements. All five topics MUST BE ADDRESSED in the manual.
- The purpose of this chapter is to familiarize the reader with the main environmental control systems on or related to YOUR unit.

Figure 5-4. Rules for Environmental Information Chapter

5. NORMAL OPERATIONS

Consequence of Deviation for Richmond Refinery combines system controls, operating limits, troubleshooting and COD.

The Normal Operations Chapter provides the reader with information related to operating YOUR unit. It should build on the information provided in Chapter 2, Process Information. This chapter expands on the process discussion and describes major controls and control strategies. This chapter should include at least the following sections:

- System Controls
- Feed Quality, Product Quality, and Production Targets
- Operating Limits
- Consequences of Deviation

- Troubleshooting

System controls. This section identifies specific controls and control strategies for each system in YOUR unit. The discussion should identify key controls and instruments and their effect on unit operations. Discuss the same systems as discussed in Chapter 2.

Feed quality, product quality, and production targets. To create this section, it is recommended that you provide a table of key, controllable unit variables, their normal range, and comments concerning control actions taken to keep operation most efficient. Table 5-2, Sample Product Quality and Production Targets, illustrates a method for summarizing this information. You should also include the location of sample points.

Table 5-2. Sample Product Quality and Production Targets

CONTROLLED VARIABLE	CONTROLLER NO.	NORMAL RANGE	COMMENTS
Feed Rate from V-1560	LIC-1561	30-70%	Tune valve for minimum gain; highest priority is steady flow to C-1580.
Vapor Feed Rate from V-1560	PIC-1561	150-170 psig	Tune valve for minimum gain; allow pressure to float and provide steady feed to C-1580. Future operation with PSA will be at 350 psig.

Operating limits. Discuss key process parameters, safe operating limits, and methods of control. Table 5-3 shows typical process variable operating limits.

Table 5-3. Sample Process Variable Operating Limits

Controlled Variable	Controller No.	Normal Range	Effect on Quality and Unit Operation
Feed Pump Pressure	PCV-050	40-60 psig	High pressure may overamp the P-6100 pump, cause a high P-1101 discharge pressure and damage downstream exchangers.
Desalter Pressure	PCV-251	190-210 psig	High pressure can lift a safety, which may not reset, send crude to the Flash drum and upset its level. Low pressure may create a vapor space at the tops of the Desalters, which can cause arcing.
Flash Drum Pressure	PCV-272	25-75 psig	High pressure will load-up atmospheric furnaces, may lift safety at 100 psig. Low pressure may cause foaming or loss of suction on P-1102.
C-1100 overhead pressure	PCV-041, PCV-473, PCV-476	12-26 psig	High pressure holds naphtha down in the jet and may lift the safeties set at 50 psig. Low pressure may overamp the compressors. Make up fuel gas has to be reprocessed in the H2S Plant.
Overhead temperature/reflux rate	TCV-450, FCV-451	250°F - 300°F	High temperature drives jet up into the naphtha. Too little reflux dries the upper trays, and fractionation suffers. Low temperature may condense water before the top of the column. High reflux rate can flood the column, making jet flash low/

Consequences of Deviation (COD). Provide the normal operating range, the safe upper and lower limits, and consequences of deviation for critical parameters on the unit or in each system. The majority of the information is provided in table form.

A consequence of deviation indicates what potentially can happen if a process variable goes out of control with intervention. Table 5-4 shows consequences of deviation from the safe lower limit, safe upper limit, and the normal operating range of the listed process variables. This information is also useful in developing cautions and warnings within the normal operating procedures.

Table 5-4. Sample Consequences of Deviation

C-1160 Vacuum Column

Process Variable	Safe Lower Limit	Safe Upper Limit	Normal Operating Range	Consequence of Deviation	
Overhead pressure	N/A	15" Hg vacuum	126 -29" Hg	low =	• low cooling water rate to condensers, • low steam flow to eductors
				high=	• Unable to split gasoils from resid, • bottoms sections fills up, • Flash Zone fills up, • unable to enter FZ with oil, • trays upset and poor fractionation
Flash Zone Temp	N/A	785°F	755 - 770°F	high=	• cracking • tray coking • Increased overhead gas rate
VTPA rate	18.8 MBPD	50 MBPD	20-35 MBPD	low=	• below pump minimum – pump overheats • dry trays • poor fractionation
				high=	• oil carryover to V-1160 & k-1171 • shut down compressors • flooding • high Δ pressure • poor fractionation
VBPA rate	32 MBPD	70 MBPD	35-55 MBPD	Low=	• below pump minimum-pump overheats • dray trays • poor fractionation
				High=	• flooding • dray trays • poor fractionation

Troubleshooting. Provide troubleshooting guidance for some of the more important or more likely off-normal parameters or sample trends. Use tables or decision trees to provide system or equipment-specific information. Table 5-5 of provides a troubleshooting guide that shows probable cause and corrective action for various situations. Following a logical path of reasoning creates these tables:

- Locate the suspect root cause by analyzing both upstream and downstream trends.
- Verify that the suspect process created the off-normal trends observed throughout the unit.
- Troubleshoot the root cause process to determine the root cause.

Table 5-5. Sample Trouble Shooting Guide

Situation	Probable Cause	Corrective Action
C-1100 Low Pressure	• Crude slate has low light-ends content	• Check crude streams for gravity. Direct crude slate change from planning.
	• K-1100 needs loading adjustment	• Adjust loading
	• K-1100 spillback has failed closed	• Check valve stem position
	• V-1100 to relief line is leaking through	• Check valve stem position. Listen to the feel valve body.
	• Safety is leaking	• Inspect safeties
C-1100 High Delta Pressure	• Reflux or pump around rate is too high	• Check column intermediate Δ pressure calculations. Adjust pumparound rates and heat removal systems to affect overhead reflux rates
	• Need to draw more product	• Check ATPA and ABPA suction pressures. Refer to sample results.
	• 5SCPB rate is too high	• Direct I&E to check overflash rate meter. Check valve stem position.
	• Stripping steam rate is too high	• Direct I&E to check stripping steam meter. Check valve stem position.
	• Washoil trays are plugging off	• Check calculation for Δ between ABPA suction pressure and flash zone pressure.
Overhead Temp Too high at Max Reflux Rates	• Plant has become feed rate limited	• Report plan limit. Direct crude slate change from planning.
	• Overhead exchangers are fouled	• Check temperatures in and out to exchangers.
	• Flash zone temperature is too high	• Lower furnaces outlet temperatures
	• Reflux rate indication is bad	• Direct I&E to calibrate reflux rate meter
	• Need more overhead fans	• Check all fans on and operating properly.

Figure 5-5, Rules for Normal Operations Chapter, provides some important considerations for writing this chapter.

- System controls should be described. Include diagrams, where possible, to clarify control discussions. Controls are described by walking through the process streams in the same manner as they were described in Chapter 2.
- **OSHA requires Consequences of Deviation (COD).**
- Identify each key process parameter for YOUR unit (or for each system within YOUR unit). These are normally temperatures, pressures, or flow rates.
- Identify the instrument that measures the parameter, the normal range, and the safe upper and lower values.
- Determine the consequence of deviation by asking, "What happens if this parameter is outside the safe limits?" Consequences can be damage to equipment, hazardous chemical emission, environmental emission, or personnel injury.

Figure 5-5. Rules for Normal Operations Chapter

6. EQUIPMENT DESCRIPTION

The Equipment Description Chapter provides the reader with information for major equipment on YOUR unit to supplement the process descriptions in Chapter 2. Illustrations can be provided for selected components. Data tables are also valuable tools for summarizing equipment data. Maximum intended inventory levels calculated by your engineering department can be referenced in this chapter.

This chapter should include a section for each system described in Chapter 2, Process Information. Figure 5-6, Rules for Equipment Description Chapter, provides a few helpful guidelines for this chapter.

It is recommended that the sources for the equipment data tables be identified. This can be done by adding a row to the bottom of each table; by describing the source in the text material, or by linking to system wide equipment databases.

- Equipment descriptions can include design information, such as design temperature, design pressure, capacity, and construction materials.
- Illustrations should only be used for important equipment when deemed necessary for proper operator understanding.
- This chapter should include a summary table of equipment names and numbers as a quick reference.

Figure 5-6. Rules for Equipment Description Chapter

7. Utilities

The Utilities Chapter provides the reader with information related to the utility services that support unit operations. Each section provides specific information relative to utilities: where they come from, why they are used and any unusual features or particular hazards.

The sections are discussed from the operations point of view. If available, include a narrative description of the design basis for the relief description.

> For example, "the relief system was designed to safely relief a full butane tank on a 120°F day if the refrigeration system stops working."

Chapter 7 may include but should not be limited to, the following sections:

- Introduction
- Steam
  - 70# Steam
  - 150# Steam
  - etc.
- Water
- Lube Oil
- Air
- Nitrogen
- Fuel gas
- Electrical
- Relief
- Drainage
- Wash Oil
- Seal Flush Oil
- Steam Quench
- Chemicals

Revision Record

Date	Step #	MOC#	Comments
1-30-09		N/A	Added -Remote Board Operator Switches to **Unit Safety Systems and Devices** – Page 6

Details for developing Volume II - Operating Procedures

This section will guide you through the process of writing operating procedures.

6.1 Use of Operating Procedures

Operating procedures contain concise, step-by-step instructions for the proper normal operation of YOUR unit. Operating procedures:

- Guide the qualified operator in carrying out job tasks. Procedures contain detailed steps, sign-off lines, cautions, warnings, and notes that assist the operator in properly completing the tasks.
- Serve as training tools for qualifying an operator. The procedure is used during training, along with job aids or other reference materials.
- Operating procedures are written and designed using human factors guidelines

6.2 Volume II Content Guidelines

This section provides an overview of the operating procedures volume content and the contents of each operating procedure. Writing style guidelines are found in Appendix G - Writing Operating Procedures for the EOM and in Appendix I – Writing Emergency Procedures.

Volume Sections

Table of Contents- This is created to list all of the procedure numbers/titles contained in Volume II.

Introduction- The Introduction explains the purpose of the operating procedures, the volume contents, procedure contents, procedure formats, and instructions on how to select and use the operating procedures. Content guidelines for the Introduction are provided below.

1. **Purpose of Operating Procedures-** Provides the reader a general overview of the operating procedures volume. The text covers the intent of the operating procedures for Chevron.
2. **Contents of Volume II-** Describes the three major groupings of procedures within Volume II: Normal Procedures, Alarm Procedures, and Routine Duties.
3. **Procedure Sections-** Describes the sections within a procedure, such as the title block, purpose, precautions, references, prerequisites, and procedure step sections.
4. **Page Formats-** Describes and illustrates standard formats for major sections.

Determining when Procedures are Needed

Two mechanisms are available to help determine when procedures are needed:

- The job task analysis performed for the unit.
- The existing procedures that were written in the past to satisfy a purpose.

A procedure is generally needed on a unit when one or more of the following is true:

- The task is difficult, composed of many steps, and must be done in a precise order.
- The task is complex, requires coordinating two or more operators, or requires coordinating the actions of individuals in separate divisions.
- The task could result in personal injury and is not a routine task
- The task could result in equipment damage and is not a routine task.
- The task could result in environmental release and is not a routine task.
- Critical alarms all need test procedures. Alarms that are routinely tested are listed in a routine duty procedure. The routine duty will reference the appropriate alarm test procedure.

Section 4 of the GUIDEBOOK describes a process in which the task analyst and senior operator/lead developer work together to determine what procedures are needed and how best to obtain the source material needed for each procedure.

Procedure Contents

Operating procedures contain some or all of the following sections:

Title block. This section uniquely identifies the procedure by providing the title and number of the procedure. This section also contains the approval signature and date to provide position approval control of all procedures.

Purpose. This section provides a clear statement of the goal of the procedure.

Safety precautions. This section includes:

- Special safety equipment needed to perform the procedure.
- Safety warnings and cautions that must be remembered while performing the procedure. These statements apply to the entire procedure. Safety precautions that are specific to an individual step is placed in a box immediately prior to the affected step.

Environmental precautions. This section contains concerns such as discharge to sewer and venting to atmosphere.

References. This section includes any procedures, documents, or task details the user may need while performing the procedure. Number and title identify references so the user can easily locate them.

The statement "The COD table for this plant is located under Volume 1 on the Business Unit's EOM page" is on the template and must be included in the Reference section of each procedure and checklist.

Prerequisites. Prerequisites are independent actions or procedures that must be complete and plant conditions that must exist before the procedure steps are started. Examples are:

- Operability of systems and components has been confirmed before removal from service.
- The correct system or equipment configuration is in place.

Detailed procedure steps. This section provides summary steps, with all detailed sub-steps and sub-sub-steps. To the left of each major step, a summary of the action is provided as a "hanging header." Sign-off lines are provided to the right of each step for recording operator initials, date, and time of step completion.

Revision Record

Date	Section	MOC #	Comments
6/19/12	References	County Audit	A13-10: Added the statement regarding COD table locations in the Reference section of procedures and checklists.

DETAILS FOR DEVELOPING VOLUME III - EMERGENCY PROCEDURES

This section will guide you through the process of writing emergency procedures and discuss the computer tools available to help you write the emergency procedures. Many of the guidelines provided in Section 6 for the development process and writing style are also applicable to writing emergency procedures. This section explains the contents, formats and writing process specific to emergency procedures.

7.1 Use of Emergency Procedures

Emergency procedures contain concise instructions to guide operators in responding quickly to a unit upset or emergency. They help the operator to stabilize the unit and either prepare the unit for return to normal operations or shut the unit down. Because of the rapid response time required, operators need to memorize the immediate action steps of the emergency procedures.

By ChevronTexaco's interpretation of the law, all emergency procedures must be preceeded by a statement of who has the authority to initiate it. Including the following statement in every emergency procedure may address this interpretation, "this procedure can be initiated by anyone who is qualified to run the process." For procedures where this is true, include such a statement.

For other emergency operations, you may need to assess the nature of the emergency operation to determine who has the proper information, skills, and authority to initiate the procedure based on refinery policy, and then modify the generic statement as required.

Emergency procedures meet a two purposes:

- The detailed action step section of the procedure acts as a training tool for a qualifying operator. This part of the procedure, therefore, contains details, notes, cautions, and warnings that could not be expected to be followed in the event of an emergency. Sign-off lines are provided to serve as a check list for confirming that all appropriate actions have been performed.
- The summary section of the procedure is intended to be maintained and used on the unit. This part of the procedure contains steps that can be followed by an experienced operator in a real emergency.

7.2 Volume III Content Guidelines

This section provides an overview of the emergency procedures volume contents and the contents of each emergency procedure. The procedure writing style guidelines are in Appendix I- Writing Emergency Procedures.

VOLUME CONTENTS

Table of Contents. This is created to list all of the procedure numbers/titles contained in Volume III. A template is provided.

Introduction. The Introduction explains the purpose of the emergency procedures, describes their content and format, and gives instructions on how to select and use the emergency procedures. Content guidelines for the Introduction are provided below.

1. **Purpose of Emergency Procedures.** Tells the reader why the emergency procedures exist and how they are used. The text covers the intent of the emergency procedures for ChevronTexaco U.S.A.

2. **Procedure Sections.** Describes the two major sections within an emergency procedure:

   - Detailed section, which provides detailed steps for immediate actions, stabilizing actions, and exit actions.

   - Summary section, which provides a single page checklist type of reference for the immediate and stabilizing actions.

3. **Page Formats.** Describes and illustrates standard formats for the emergency procedure sections.

DETERMINING WHEN PROCEDURES ARE NEEDED

Three mechanisms are available to help determine when emergency procedures are needed:

- Regulatory requirements.

- Procedures were written in the past to satisfy a purpose that is still valid.

- The job task analysis performed for the unit identifies a need.

Specific guidelines for identifying the emergency procedures needed for a unit are:

- OSHA 1910.119 calls for safe shutdown procedures. An emergency procedure series, EP-100, as been established to satisfy this requirement.

- If the loss of utility services will create an upset or emergency at your unit, the emergency procedure series EP-200 should contain appropriate procedures.

- If unusual occurrences have been postulated as a concern for your unit, the emergency procedure series EP-400 should contain appropriate procedures. This might be the result

of original work by the vendor, engineering design work, or hazards analysis (PHA, HAZOP) performed for the unit.

- If an emergency procedure already exists based on past experience or a need that is still valid, this procedure should be included.

Section 4 of the GUIDEBOOK describes a process where the task analyst and senior operator/procedure developer work together to determine which procedures are needed and how best to obtain the source material needed for each procedure.

Procedure Contents

Each emergency procedure contains the following sections:

Title block, page 1. This section identifies the procedure as an emergency procedure and provides the title and number of the procedure. This section also contains the approval signature and date to provide position approval control of all procedures.

Summary section. This section contains the summary steps for the procedure. These summary steps are divided into two columns. Immediate actions come first followed by stabilizing actions, starting with immediate actions listed in the left column. This one-page section is intended to be maintained in hard-copy format on the unit for quick reference during an emergency.

Title block, page 2. Another title block is provided on page two to maintain positive approval control in the hard-copy signed documents if page 1 is separated from the rest of the procedure.

Detailed section. This section repeats the summary steps and adds all detailed sub-steps and sub-sub-steps. To the left of each major step, the position responsible for the action is provided as a "hanging header." Sign-off lines are provided to serve as a check list for confirming that all appropriate actions have been performed.

The reader has all they need to begin developing material for volume IV of the EOM using the following tools:

- Develop **Training Guide** -

  Explains how to begin writing the training material for your area.

- **Action verbs** -

  Highly recommended resource. Defines the meaning of action words, called verbs, commonly used to give work direction in procedures and job aids.

- **Job Aid template**

  The acceptable standard for writing a job aid, but Power Point and video are acceptable as well.

- **Instructor-Qualifier Guide template**

  The acceptable standard for writing an instructor/qualifier guide. An excellent tool for those delivering on the job training as it identifies specific tasks and identifies areas of proficiency that individuals must demonstrate in order to solo qualify.

- **Lesson Plan template**

  Acceptable standard used to develop plans for training.

CONVERTING EXISTING AND FIRST GENERATION OPERATING MANUALS

This section provides guidelines and advice for converting existing operating manuals, which are already in an electronic format. The three major topics are:

- Converting a manual previously created in standard Chevron (14-tab) format. These are not written using human factor design and must be updated to comply with standards explained in Chapter 5, 6, 7 and 8 of this GUIDEBOOK.
- Creating a second generation operating manual from a first generation manual. Some second generation operating manuals are not written using human factor design and must be updated to comply with standards explained in Chapter 5, 6, 7 and 8 of this GUIDEBOOK.
- Collecting and organizing process and equipment data.

9.1 Converting a Manual Previously Created in Standard Chevron (14-tab) Format

Efficiencies are obtained when the operating manual of interest has already been created electronically (i.e., word-processed) per the Chevron Operating Standard "14-tab" format, and the development team should take advantage of this. Two types of efficiencies are possible:

- Word-processed material can be imported into Word Templates.
- The standard organization of the "14-tab" manual can be mapped into the 7 chapter organization standard.

Importing the existing electronic files into the new Word templates described in Appendix F can minimize re-work. Once text is brought in, the appropriate styles are applied to every line of text using the standard style conventions contained in the templates. It is possible to perform this conversion with a variety of word processing packages for the source document. Microsoft Word recognizes and will import files from several of the standard word processing software packages.

Obviously, re-write may be needed where material is not well constructed, but it is expected that most of the existing material should be immediately useful, particularly for manuals that have recently been updated

There is little value in simply converting outdated or non-useful information into attractive page formats. Verify the information is up to date.

The EOM uses many of the same topic headings as the previous Chevron "14-tab" standard. This makes it reasonably straightforward to map the existing information into the appropriate location in the electronic operating manual. Table 9-1 provides a detailed cross-reference to assist you in mapping the existing manual to the EOM.

Table 9-1. Detailed Comparison of Operating Manual Organization Standards

CHEVRON "14-TAB" FORMAT (Per Refinery Instruction)	ELECTRONIC OPERATING MANUAL
1.0 TABLE OF CONTENTS	TABLE OF CONTENTS
2.0 INTRODUCTION 2.1 Overview process and purpose 2.2 References to other materials dealing with process such as Hazcom Binder, Safe Work Practices Book, E9900's, etc.	1. INTRODUCTION 1.1 Purpose of the Manual 1.2 Organization of the Manual 1.3 Purpose of the Division/Complex 1.4 Purpose of this Plant/Unit 1.5 History of Upgrades/Modifications 1.6 General Nomenclature 1.7 List of Reference Material

CHEVRON "14-TAB" FORMAT (Per Refinery Instruction)	ELECTRONIC OPERATING MANUAL
3.0 PROCESS INFORMATION 3.1 Basic principles of process chemistry 3.2 Process Flow Diagram	2. PROCESS INFORMATION 2.1 Process Overview 2.2 Process Streams 2.3 Feed Sources/Streams 2.4 Product/Effluent Streams 2.5 Process Chemistry 2.6 Integrated Operation 2.7. Economics 2.8 PFDs, P&IDs, and Physical Layout Drawings

CHEVRON "14-TAB" FORMAT (Per Refinery Instruction)	ELECTRONIC OPERATING MANUAL
4.0 EQUIPMENT 4.1 Brief description of major pieces of equipment: - furnaces - vessels - columns - tanks - utility equipment 4.2 Control valves 4.3 Equipment min. and max. parameters 4.4 Max intended inventory and levels 4.5 Alarms 4.6 Interlocks 4.7 Lube charts 4.8 Process monitoring 4.9 Safe upper/lower limits 4.10 Pressure relief devices 4.11 Complete list of numbered equipment: - vessels - columns - pumps - compressors - tanks	6. EQUIPMENT DESCRIPTION 6.1 Summary of Equipment 6.2 Reactors 6.3 Columns 6.4 Vessels 6.5 Furnaces 6.6 Pumps and Drivers 6.7 Exchangers and Coolers 6.8 Miscellaneous Equipment (Compressors, Filters, Strainers, Blowers, and Ejectors) 6.9 Other Special Equipment Tables (as needed)

CHEVRON "14-TAB" FORMAT (Per Refinery Instruction)	ELECTRONIC OPERATING MANUAL
5.0 SAFETY INFORMATION 5.1 Plant hazards 5.2 Ventilation systems 5.3 MSDS 5.4 Listing of Plant hazardous chemicals/substances 5.5 Plant specific safety procedures 5.6 Fire and safety checklist 5.7 Plot plan for fire and safety equipment	3. SAFETY INFORMATION 3.1 Responsibilities 3.2 Process Safety Management (PSM) Overview 3.3 Potential Plant/Unit Hazards 3.4 Personnel Safety Issues 3.5 Unit Safety Systems and Devices 3.6 Fire Protection Equipment 3.7 Failure Prevention
6.0 ENVIRONMENTAL INFORMATION 6.1 Rules and regulations for unit 6.2 Reference Environmental Compliance Manuals for more info 6.3 Reference location of environmental records	4. ENVIRONMENTAL INFORMATION 4.1 Environmental Philosophy at Chevron 4.2 Odor Control 4.3 Air Quality 4.4 Noise Reduction 4.5 Water Systems 4.6 Special Topics (as needed)

CHEVRON "14-TAB" FORMAT (Per Refinery Instruction)	ELECTRONIC OPERATING MANUAL
7.0 UTILITIES 7.1 System descriptions for: - Steam - Water - Fuel gas/Natural gas - Nitrogen - Air - Drainage systems - Electrical systems - Relief systems - Other 7.2 Relief design basis	7. UTILITIES 7.1 Steam 7.2 Water 7.3 Lube Oil 7.4 Air 7.5 Nitrogen 7.6 Fuel Gas 7.7 Electrical 7.8 Relief 7.9 Drainage 7.10 Wash Oil 7.11 Seal Flush Oil 7.12 Steam Quench 7.13 Chemicals 7.14 Plot Limit Connections 7.15 Pumpout and Offtest System 7.16 etc.. (as needed)
8.0 INITIAL START-UP 8.1 Initial Start-up Procedure	OPERATING PROCEDURES (VOLUME II) NORMAL PROCEDURES: 1000 Initial Start Up Procedure

CHEVRON "14-TAB" FORMAT (Per Refinery Instruction)	ELECTRONIC OPERATING MANUAL
9.0 NORMAL OPERATIONS 9.1 Regulation and control of process variables, relationship with other plants, and description of control systems. 9.2 Consequences of deviating from the process operating limits listed in tab section 4.0 "Equipment". 9.3 Steps required to correct and/or avoid a deviation from operating limits listed in tab section 4.0 "Equipment". 9.4 Actions required to optimize and economize plant operation. 9.5 List location of all sample points during all phases of operation. 9.6 List sample schedule for all phases of operation. 9.7 List all sample reports	5. NORMAL OPERATIONS 5.1 Product Quality and Production Targets 5.2 Operating Limits 5.3 Consequence of Deviation 5.4 Troubleshooting 5.5 Process Control Details - First System/Process 5.6 Process Control Details - Second System/Process 5.6 Process Control Details - Third System/Process 5.8 etc. (continue as needed)

CHEVRON "14-TAB" FORMAT (Per Refinery Instruction)	ELECTRONIC OPERATING MANUAL
10.0 SPECIAL PROCEDURES 10.1 All procedures not related to Start-up/Shutdown, normal operation of the plant, or emergency procedures will be located in this section.	OPERATING PROCEDURES (VOLUME II) 4000 EQUIPMENT PROCEDURES 4100 Reactor Related Procedures 4200 Column Related Procedures 4300 Vessel or Drum Related Procedures 4400 Furnace Related Procedures 4500 Pumps and Drivers Related Procedures 4600 Exchangers/Coolers Related Proc. 4700 Misc. Equipment Related Procedures 4800 Routing and Flushing Procedures 4900 Administrative Procedures 5000 System Procedures 6000 Alarm Response 7000 Alarm Test 8000 Routine Duties 9000 Temporary Procedures

CHEVRON "14-TAB" FORMAT (Per Refinery Instruction)	ELECTRONIC OPERATING MANUAL
11.0 EMERGENCY PROCEDURES 11.1 This section is dedicated to emergency operations procedures. The following is a list of the types of procedures that belong in this section: • Loss of cooling water • Loss of steam • Loss of furnace circulation or flow • Loss of instrument air • Loss of fuel gas/natural gas • Loss of electrical power • Loss of hydrogen recycle • Other 11.2 This section will also include the job title of the person(s) who may initiate a shutdown (dependent upon situation; the person who is qualified and has knowledge of the process)	EMERGENCY PROCEDURES (VOLUME III) 100 EMERGENCY SHUT DOWN 200 LOSS OF UTILITIES 201 Power Outage with Emergency Generator On 202 Power Outage with Emergency Generator Out of Service 203 Instrument Air Failure 204 Instrument Electrical Failure 205 Loss of Cooling Water 20x etc. (continue as needed) 300 LOSS OF CRITICAL SYSTEMS /COMPONENTS 301 Loss of Feed 302 Loss of Makeup 303 Loss of xxxxx 304 Loss of System xxxxxx 30x etc. (continue as needed) 400 UNUSUAL OCCURRENCES 401 xxxx Temperature Runaway 402 Tube Rupture xxxxx 403 Fire Near High Pressure Equipment 40x etc. (continue as needed)

CHEVRON "14-TAB" FORMAT (Per Refinery Instruction)	ELECTRONIC OPERATING MANUAL
12.0 START-UP/SHUTDOWN PROCEDURES 12.1 Start-up Procedures 12.2 Shutdown Procedures	OPERATING PROCEDURES (VOLUME II) NORMAL PROCEDURES: 2000 Startup Procedures 2001 Startup Critical Path Diagram 2002 Normal Startup 2003 Special Startup 2004 etc. 3000 Shutdown Procedures 3001 Shutdown Critical Path Diagram 3002 Unit Shutdown 3010 Wash Oil xxx xxx 3020 Pump Out xxx xxx 3030 Steam Out xxx xxx 3040 Water Wash xxx xxx 3050 Isolate xxxxxx 3060 Clean Up xxx xxx 3060 etc. (continue as needed)
13.0 HAZOP	Not considered part of the electronic operating manual.

CHEVRON "14-TAB" FORMAT (Per Refinery Instruction)	ELECTRONIC OPERATING MANUAL
14.0 APPENDICES 14.1 All plant P&ID's and index if needed 14.2 Glossary of terms 14.3 Material of Construction drawings 14.4 Electrical classification drawings 14.5 List of design codes and standards used in the design of the process. 14.6 Material and Energy Balance sheets for plants built after 5/26/92.	APPENDIX A. DEFINITIONS FOR COMMONLY USED TERMS AND ACRONYMS P&IDs for the Unit will be immediately accessible as part of the electronic operating manual. Other items may be accessible electronically by navigation to "General Refinery Information."

9.2 Creating a Second Generation Operating Manual from a First Generation Manual

Efficiencies are obtained when the operating manual of interest is already created in EOM templates and the development team can take advantage of this. The improved work process for developing EOMs presented in Section 4 of the GUIDEBOOK works for both first and second-generation manuals.

During the initial stages of EOM development the lead developer coordinates with the refining EOM champion to find out what similar manuals have been developed; the best practices master is another resource that can help. In addition to using the existing 14-tab manual as a resource, the lead developer collects all similar manuals (both hard and electronic copies) from across the Chevron system. These manuals are used as a resource when the lead developer reviews material to develop a list of procedures. The task analyst still needs to do a thorough job analysis.

Once the table of contents has been developed and approved by the ABU, material from existing EOMs can be cut and pasted into your manual. Re-write is often needed where material is not well constructed, but it is expected that most of the existing material should be immediately useful, particularly for manuals updated recently.

There is little value in simply renaming another refinery manual if your unit has physical differences or crews operate differently. Verify the information is applicable to your unit.

This effort is based on free sharing of information. There is no reason to not share information with other refineries. Even invalidated information is of great value, and since it will need to be validated for your unit, there is no danger that an invalidated procedure from another refinery will be put into service without validation at yours.

If you receive information from another unit and they operate differently than your unit or you feel the quality of their information is not as good as you would make it, be sensitive and do not criticize. Criticism between units can reduce sharing of information. If you see a blatant safety hazard in a procedure or you think you have a better way of describing something, you should tactfully present this information to the unit where the information came from. Do this in a constructive way.

9.3 Collecting and Organizing Process and Equipment Data

It is recommended that as data is collected to support the electronic operating manual development, a spreadsheet be used to maintain and preserve the information. Examples of data collection formats for this purpose are shown in figure 9.1 and 9.2

Figure 9-1. Data Collection Table for Process Streams

Product or Process Stream	1							
Other Names	2							
Equipment in Stream	3				GRAPHIC #			
	Flow	**Pressure**	**Level**	**Temp**	**Old Location**	**Owner**	**Needed?**	**Verified?**
4 DESIGN LIMIT HIGH	27	28	29	30	31	32	33	34
5 SAFE OPERATING LIMIT HIGH								
6 OPTIMUM OPERATING LIMIT HIGH								
7 OPTIMUM OPERATING LIMIT LOW								
8 SAFE OPERATING LIMIT LOW								
9 DESIGN LIMIT LOW								
10 INFO LOCATION / OWNER								
11 VALUE INDICATOR LOCATION								
SAFETY EFFECTS IF VALUE IS EXCEEDED								
ROCESS EFFECTS IF VALUE IS EXCEEDED								
14 HOW VALUE IS CONTROLLED								
15 SAFE UPSTREAM BLOCK POINT								
16 SAFE DOWNSTREAM BLOCK POINT								
MISSED OPPORTUNITY TO PRODUCTION	35				36			
17 IF EXCEEDED								
STREAM ORI 18								
DESTINATIOI 19								
20 RELATED PRODUCT EFFECTS	37				38			

Laboratory Tests		**Correct**	Streams/Products		**Correct**		
Test Nam	Lab Proc #	**Hi Proc**	Affected by Move		**Low Proc**		
21	22	23	24	25	26	PRODUCT INFO	39
						PRODUCT MSDS	40
						OPERATING PROCEDURE #	
							41

The data entry items for Figure 9-1 on process streams are explained below:

1 Formal equipment reference number (file number for this database)

2 Commonly used name (secondary reference name)

3 Other names

4 Absolute design limit for each of the process variables

5 Safe Operating limit

6 Optimum

7 Lower design limit for each of the process variables

8 Safe lower Operating limit

9 Optimum low limit

10 The owner and keeper of the evergreen value of the four process variables

11 How value is monitored and location of the monitor

12 If any process variable is exceeded, what is the safety result or consequence

13 If any process variable is exceeded, what is the effect to the associated process stream

14 How is the process variable controlled: HIC.XXX, LIC.XXX, etc.

15 Should failure occur, where can this equipment be safely blocked in

16 Same as above

17 Economic consequences if process variable is exceeded ("X" under the variable with an explanation out to the right)

18 State origin of this stream (3rd Sidecut, tank field, etc.)

19 Where is stream routed (TK.XXXX, V.XXXX, etc. {refer to equipment ID or process ID})

20 If indicated variable is exceeded, what is the impact to other products (if draw temp high, then the product below is heavy)

21 Example: Freeze, Flash, etc.

22 Lab Procedure to run test

23 How to correct for high value on lab test (4CU.XXX, Control 4th SC Flash Point, etc.)

24 How and what products that are effected by correcting the above procedure (cutting 4th SC may produce Δ for 5th SC)

25 Opposite effect for above

26 Procedure to correct for low value on lab test

27-30 Indicate value

31 Location of data (SIS, EDS, Design Specifications, etc.)

32 Location of evergreen data

33 If necessary, location of data in OPS

34 Check accuracy

35 Indicated by "X", which variables will impact production

36 Describe how variables impact production

37 Indicate by "X", which variables will impact other product streams

38 Describe how variable impacts other product streams

39 Indicate references to this stream (RI.XXX)

40 Enter MSDS ID

41 Associated Operating Procedures

Figure 9-2 Data Collection Table for Equipment

Equipment ID #	1							
Formal Name	2							
Common Name	3				GRAPHIC #			
					Old			
	Flow	**Pressure**	**Level**	**Temp**	**Location**	**Owner**	**Needed?**	**Verified?**
4 DESIGN LIMIT HIGH	29	30	31	32	33	34	35	36
5 SAFE OPERATING LIMIT HIGH								
6 OPTIMUM OPERATING LIMIT HIGH								
7 OPTIMUM OPERATING LIMIT LOW								
8 SAFE OPERATING LIMIT LOW								
9 DESIGN LIMIT LOW								
10 INFO LOCATION / OWNER								
11 VALUE INDICATOR LOCATION								
SAFETY EFFECTS IF VALUE IS EXCEEDED								
ROCESS EFFECTS IF VALUE IS EXCEEDED								
14 HOW VALUE IS CONTROLLED								
15 SAFE UPSTREAM BLOCK POINT								
16 SAFE DOWNSTREAM BLOCK POINT								
MISSED OPPORTUNITY TO PRODUCTION								
17 IF EXCEEDED								

BLIND LIST INFO	18				EDS		37	
					P & ID #		38	
					PRODUCT INFO		39	
MANUFACTURER		19			PRODUCT MSDS		40	
SERVICE		20			PSI #		41	
ANSI		21			PSI #		42	
HEAT TREATED		22			PSI #		43	
UT HISTORY		23			HYDRO TEST psig		44	
RELIABILITY PLAN		24			RELATED UTILITY STREAMS			
TY CONSEQUENCE / EQUIPMENT FAILURE		25					45	
RELATED PRODUCT EFFECTS		26						
CORROSION MECHANISMS		27			**OPERATING PROCEDURE #**			
INSPECTION RECOMMENDATIONS		28					46	

The data entry items for Figure 9-2 on equipment are explained below:

1. Formal equipment reference number (file number for this database)
2. Commonly used name (secondary reference name)
3. Other names
4. Absolute design limit for each of the process variables
5. Safe Operating limit
6. Optimum
7. Lower design limit for each of the process variables
8. Safe lower Operating limit
9. Optimum low limit

10. The owner and keeper of the evergreen value of the four process variables
11. How value is monitored and location of the monitor
12. If any process variable is exceeded, what is the safety result or consequence
13. If any process variable is exceeded, what is the effect to the associated process stream
14. How is the process variable controlled: HIC XXX, LIC XXX, etc.
15. Should failure occur, where can this equipment be safely blocked in
16. Same as above
17. Economic consequences if process variable is exceeded ("X" under the variable with an explanation out to the right)
18. List flanges, size, face, and pounds for blinds
19. Manufacturer
20. Equipment service

21-28 As required

29 -32 Indicate variable

33. Location of data (SIS, EDS, Design specifications)
34. Location of evergreen data
35. Location of data in OPS
36. Accuracy of data: Y/N

37 - 44 As required

45. Indicated associated Utilities reference location (150 psi Steam, see Steam XXX)
46. Operating Procedures (Vol. I, pages 4 2)

TOOLS FOR MANAGING OPERATING MANUAL DEVELOPMENT EFFORTS

By the time you reach this section of the GUIDEBOOK, it is clear there is work to be done to achieve EOMs throughout the Richmond Refinery. This effort not only brings in the past work done on operating manuals, but integrates training materials, PSM information, human factors techniques, and computer tools to achieve an on-line, user-friendly presentation of the information needed by operators.

Tools and examples of tools are presented throughout the GUIDEBOOK that helps manage work on this effort. This section intends to tie these tools together and present additional work management tools, which will help you to identify, plan, and track progress for the work.

10.1 Tools and Guides

Throughout the GUIDEBOOK, tools and guidance are provided to help you plan and organize work and to carry out operating manual enhancement/development tasks. These are summarized in Table 10-1 below to serve as a review and reference for managing manual development.

Table 10-1 Summary of Tools for Managing Operating Manual Work

Tool	Purpose	Location in GUIDEBOOK[1]
1. Standard contents for Volume I, Process and Equipment Description	Use this to develop your detailed outline. Stick with the topics listed and standard section numbering as much as possible.	Details for Developing Process & Equipment Description Description Writing for Process & Equipment Description Formats and Examples for Process & Equipment Description
2. Standard contents for Volume II, Operating Procedures	Use this to develop your list of procedures. Stick with the procedure groupings and numbering conventions.	Details for Developing Operating Procedures Writing Operating Procedures Operating Procedure Format & Examples
3. Standard contents for Volume III, Emergency Procedures	Use this to develop your list of procedures. Stick with the procedure groupings and numbering conventions.	Details for Developing Emergency Procedures Writing Emergency Procedures Emergency Procedures Format & Style
4. Standard contents for Volume IV, Training Guide	Use this to develop your detailed outline. Use this outline as a guide line and modify as needed.	Details for Developing Training Guide

[1] See GUIDEBOOK Appendices for additional information.

Tool	Purpose	Location in GUIDEBOOK[1]
5. Templates to create the TOC (items 1 - 4 above), intro chapters, and other parts of manual chapters	Electronic templates are provided to streamline your efforts to create the planning tools as well as the operating manual parts.	Manuals and Procedures web page.
6. Work breakdown structure for the model process of manual development.	Lists all of the activities and tasks to be accomplished. These a represented in a hierarchical manner, giving tasks numbers referenced throughout the GUIDEBOOK.	Tools for Managing Manual Development
7. Work flow and relationships between project tasks.	A network diagram is provided for the model process to show the sequence in which work should be carried out.	Development Process Overview
8. Activities and tools for accomplishing JTA with the operating manual	Identifies the computer tools used to perform the various analyses, capture the data needed, and convert this into the operating manual formats. Links training and procedures efforts together.	Details for Conducting JTA
9. Criteria for determining when job aids should be developed	Provides guidelines for making the decision on job aids	Criticality Index
10. Guidelines for selecting types of job aids to be developed	Where the decision is made to create job aids, guidelines are provided on determining the type of job aid to create.	Job Aid Tools
11. Guidelines for converting an existing Chevron manual to electronic format	Guidelines are provided for taking an existing Chevron manual developing per the "14-tab" format and converting it.	Converting Existing & First Generation Manuals
12. Procedure/task detail cross-reference matrix	A detailed spreadsheet example is provided to help the Manual Developer determine how procedures, task details, and job aids are interrelated.	Procedure/Task Detail Cross-Reference Matrix
13. Tool for tracking overall project work	See Manuals and Procedure Specialist for Masterlist or work plan.	Not in GUIDEBOOK

10.2 Procedure/Task Detail Cross-Reference Matrix

A spreadsheet example is provided to help the manual developer determine how procedures, task details, and job aids are interrelated. The spreadsheet helps to identify those relationships and job aid types. It is important to stay organized about what information will be contained in procedures and what information will be contained in job aids.

Excel/Word spreadsheets can sort data in many ways.

In Figure 10-1, the data is sorted by JTA task detail and readily shows cases when one job aid is related to multiple procedures.

Figure 10-2 is the same data sorted by procedure number and shows those cases where one procedure is related to multiple job aids.

Other sorts can be made, such as:

- Sort on the job aid decision column to create a list of job aids sorted by "Yes," "No," or decision not made yet.
- Sort on job aid type to group together the various kinds of job aids, such as "photo location job aids."

Sorting limitations are defined by the software application being used.

Proc. No.	Task No.	Job Aid Needed?	Type of Job Aid	Comments/Notes
NP-4320	01A01	No		
	01A02	Yes	Word Description	Check with SRU for their work on this
NP-2230	01A03	?		
NP-2230	01A04	?		
	01A05	Yes	Word Description	
NP-2230	01B04	?		
	01B05	Yes	Word Description	
NP-2230	01B06	?		
NP-4320	01B06	Yes	Decision Flow Chart	Base this on Honeywell screen
AP-6032	01C02	Yes	Decision Table	Show troubleshooting relationships
AP-7032	01C02	Yes	Multiple Resp Flowch	
EP-301	01C02	Yes	Multiple Resp Flowch	
EP-302	01C02	Yes	Multiple Resp Flowch	
EP-303	01C02	Yes	Multiple Resp Flowch	
EP-304	01C02	Yes	Multiple Resp Flowch	
EP-305	01C02	Yes	Multiple Resp Flowch	Show troubleshooting relationships
	01C03	Yes	Word Description	
	01H15	Yes	Work Sheet	Get this from vendor
NP-4400	01H23	Yes	Photo Procedural	Give detailed pump preparation
NP-4401	01H24	Yes		
	01H25	Yes	Word Description	
	01H25	Yes	Procedure Table	
NP-4401	01H26	Yes	Procedure Table	
NP-4400	01H27	Yes	Photo Location	
	01H28	Yes	Word Description	
NP-4400	01H29	Yes	Photo Location	
NP-4401	01H30	No		
NP-4401	01H30	No		
NP-4400	01H31	Yes	Photo Location	
NP-4400	01H32	No		
NP-4400	01H33	No		
	01H35	Yes	Procedure Flow Chart	
	01I06	Yes	Procedure Table	
NP-4410	01J02	Yes	Line Drawing	Show blow-up of pump internals
	01J06	Yes	Procedure Table	
NP-4410	01K01	Yes	Line Drawing	Show blow-up of pump internals
NP-4410	01K02	Yes	Line Drawing	Show blow-up of pump internals
NP-4421	01L11	?		
NP-2001	01M01	Yes	Logic Table	Show line-up strategy for training
NP-2002	01M02	Yes	Logic Table	Show line-up strategy for training
NP-2003	01M03	No		
NP-2004	01M04	No		
NP-2005	01M04	No		
NP-2007	01M05	?		
NP-2008	01M06	Yes	Decision Flow Chart	
NP-2009	01M07	Yes	Photo Location	Show hard-to find rotometer

Figure 10-1. Procedure/Task Detail Cross-Reference Matrix; Example with Data Sorted by Task Detail Number

Proc. No.	Task No.	Job Aid Needed?	Type of Job Aid	Comments/Notes
AP-6032	01C02	Yes	Decision Table	Show troubleshooting relationships
AP-7032	01C02	Yes	Multiple Resp Flowch	
EP-301	01C02	Yes	Multiple Resp Flowch	
EP-302	01C02	Yes	Multiple Resp Flowch	
EP-303	01C02	Yes	Multiple Resp Flowch	
EP-304	01C02	Yes	Multiple Resp Flowch	
EP-305	01C02	Yes	Multiple Resp Flowch	Show troubleshooting relationships
NP-2001	01M01	Yes	Logic Table	Show line-up strategy for training
NP-2002	01M02	Yes	Logic Table	Show line-up strategy for training
NP-2003	01M03	No		
NP-2004	01M04	No		
NP-2005	01M04	No		
NP-2007	01M05	?		
NP-2008	01M06	Yes	Decision Flow Chart	
NP-2009	01M07	Yes	Photo Location	Show hard-to find rotometer
NP-2230	01A03	?		
NP-2230	01A04	?		
NP-2230	01B04	?		
NP-2230	01B06	?		
NP-4320	01A01	No		
NP-4320	01B06	Yes	Decision Flow Chart	Base this on Honeywell screen
NP-4400	01H23	Yes	Photo Procedural	Give detailed pump preparation
NP-4400	01H27	Yes	Photo Location	
NP-4400	01H29	Yes	Photo Location	
NP-4400	01H31	Yes	Photo Location	
NP-4400	01H32	No		
NP-4400	01H33	No		
NP-4401	01H24	Yes		
NP-4401	01H26	Yes	Procedure Table	
NP-4401	01H30	No		
NP-4401	01H30	No		
NP-4410	01J02	Yes	Line Drawing	Show blow-up of pump internals
NP-4410	01K01	Yes	Line Drawing	Show blow-up of pump internals
NP-4410	01K02	Yes	Line Drawing	Show blow-up of pump internals
NP-4421	01L11	?		
	01A02	Yes	Word Description	Check with SRU for their work on this
	01A05	Yes	Word Description	
	01B05	Yes	Word Description	
	01C03	Yes	Word Description	
	01H15	Yes	Work Sheet	Get this from vendor
	01H25	Yes	Word Description	
	01H25	Yes	Procedure Table	
	01H28	Yes	Word Description	
	01H35	Yes	Procedure Flow Chart	
	01I06	Yes	Procedure Table	
	01J06	Yes	Procedure Table	

Figure 10-2 Procedure/Task Detail Cross-Reference Matrix; Example with Data Sorted by Procedure Number

10.3 Operating Manual Project Tracking Tool

A Microsoft spreadsheet named a Masterlist is used to help track progress made for each operating manual effort. It is based on the JTA, which covers every activity and task in the work process. It offers a place to track and demonstrate progress. The Masterlist may be in Microsoft Excel or Microsoft Word. Contact the Manuals and Procedure Specialist for your plant and request a copy of the Masterlist.

Figures 10-3 through 10-8 show examples of how data is organized, tracked and manipulated using a spreadsheet format.

Figure 10-3 shows tracking results for an entire manual and each activity and task is weighted to produce an overall set of "percent complete" data.

Figure 10-4 provides tracking data for Volume I Process and Equipment Description.

Figure 10-5 provides tracking data for Volume II Operating Procedures. Rows can be inserted to include all procedures identified for the unit.

Figure 10-6 provides tracking data for Volume III Emergency Procedures. Rows can be inserted to include all procedures identified for the unit.

Figure 10-7 provides tracking data for Volume IV Training Guide material. This table is organized by task detail number. OJT Instructor/Qualifier Guides need to be developed for all task details which are listed in the training and qualification plans. Job aids only need to be developed where this decision has been made using the criticality index.

Percent Complete Summary Page

Summary Percent Complete	Step Weight	Step Percent Complete	Gather and organize existing operating manual Section
97%	**15%**		**VOLUME 1 - PROCESS AND EQUIPMENT DESCRIPTION**
	10%	100%	information
	15%	100%	Develop Table of Contents and detailed outline
	45%	100%	Use templates to enhance/develop chapters
	20%	100%	Conduct reviews
	10%	70%	Resolve and incorporate comments
100%	**10%**		**JOB ANALYSIS**
85%	**30%**		**VOLUME 2 - OPERATING PROCEDURES**
	5%	100%	Develop template file
	5%	100%	Gather task detail information
	40%	100%	Use templates to enhance/develop procedures
	15%	100%	Conduct technical reviews
	15%	70%	Conduct quality edits
	15%	50%	Conduct validation reviews
	5%	30%	Resolve and incorporate comments
41%	**15%**		**VOLUME 3 - EMERGENCY PROCEDURES**
	5%	100%	Develop template file
	5%	100%	Gather task detail information
	40%	60%	Use templates to enhance/develop procedures
	15%	20%	Conduct technical reviews
	15%	10%	Conduct quality edits
	15%	10%	Conduct validation reviews
	5%	20%	Resolve and incorporate comments
65%	**30%**		**VOLUME 4 - TRAINING GUIDE**
	5%	100%	Develop Narrative Sections
	40%	65%	Develop Instructor/Qualifier Guides
	20%	22%	Develop Job Aids
	10%	100%	Develop Training and Qualification Plans
	20%	100%	Develop Lesson Plans
	5%	0%	Conduct Reviews and Incorporate Comments
76%			**EOM TOTAL PERCENT COMPLETE**

Figure 10-3 Operating Manual Project Tracking Tool; Example of the Main Summary Spreadsheet to Show Overall Percent Complete

Volume 1- Process and Equipment Description				Volume 1 Summary		33%
	Weight	10%	15%	45%	20%	10%
Chapter Filename	Chapter Title	Information Gathered	Outlines Developed	Chapters Developed	Chapter Reviewed	Comments Incorporated
FCCPE01.doc	1. Introduction	100%	100%	100%	100%	100%
FCCPE02.doc	2. Process Information	100%	100%	100%	50%	0%
FCCPE03.doc	3. Safety Information	100%	100%	50%	0%	0%
FCCPE04.doc	4. Environmental	50%	20%	10%	0%	0%
FCCPE05.doc	6. Startup and Operations	60%	20%	0%	0%	0%
FCCPE06.doc	Description	30%	0%	0%	0%	0%
FCCPE07.doc	7. Utilities	20%	0%	0%	0%	0%
FCCPE08.doc	Glossary	100%	0%	0%	0%	0%
		70%	43%	33%	19%	13%

Figure 10-4 Operating Manual Project Tracking Tool; Example of the Activity-A Detailed Spreadsheet

	Volume 2 and 3 Procedures		NP Summary		51%	EP Summary			0%
	Weight		5%	30%	30%	10%	10%	10%	5%
Procedure Number	Procedure Name	Due Date	File Developed	Data Gathered	Procedure Drafted	Technical Review	Quality Edit	Validation Review	Comments Incorporated
NP-2001	FCC Prestart Check		100%	100%	100%	100%	100%	100%	100%
NP-2002	Notifications		100%	100%	100%	100%	100%	0%	0%
NP-2007	Commission Fresh/Plant Water System		100%	100%	70%	0%	0%	0%	0%
NP-2003	Commission Drinking Water		100%	100%	50%	0%	0%	0%	0%
NP-2004	Commission Utility Air		100%	100%	100%	100%	100%	100%	100%
NP-2005	Commission Instrument Air		100%	100%	100%	100%	100%	100%	100%
NP-2009	Commission Cooling Water Headers		100%	100%	100%	0%	0%	0%	0%
NP-2010	Commission Fuel Gas Header		100%	100%	50%	0%	0%	0%	0%
NP-2011	Commission Natural Gas Header		100%	100%	50%	0%	0%	0%	0%
NP-9033	Initial Commissioning of McCord Lubricator		100%	100%	50%	0%	0%	0%	0%
NP-2015	Main Air Blower Train Anti Surge Test		100%	100%	100%	100%	100%	50%	0%
NP-2016	E-60 Test Waste Heat Steam Generator Soot Blower		100%	100%	100%	100%	100%	50%	0%
NP-????	E-300 Test Economizer Soot Blower		100%	100%	100%	100%	100%	100%	100%
NP-2018	Arm Process Interlock System		100%	100%	100%	100%	50%	0%	0%
NP-2020	Prepare V-80/V-70 Reactor/Regenerator, V-65 3rd Stage Separator, E-60 WHSG, and K-13A/B Electrostatic Precipitator Sections for Service		100%	100%	100%	0%	0%	0%	0%
NP-2021	Start Up Slide Valve Hydraulic Skids		100%	100%	100%	0%	0%	0%	0%
NP-2022	Start Up Butterfly Valve Hydraulic Skids S-50 and S-55		100%	100%	0%	0%	0%	0%	0%
NP-2023	Start Up K-13A/B Electrostatic Precipitators		100%	100%	20%	0%	0%	0%	0%
NP-2024	Start Up and Synchronize K-50 MABT		100%	100%	100%	100%	50%	0%	0%
NP-2025	Prepare E-60, E-61 WHSG for Start Up		100%	100%	100%	100%	50%	0%	0%
NP-2026	Prepare C-90 Fractionation Section for Service		0%	0%	0%	0%	0%	0%	0%
NP-2027	Prepare Gasoline Recovery Unit for Service		0%	0%	0%	0%	0%	0%	0%
NP-2028	Put V-80/V-70/V-65/E-60/K-13A/B Reactor/Regenerator/3rd Stage Separator/WHSG/Electrostatic Precipitator Section in Service		0%	0%	0%	0%	0%	0%	0%
NP-2029	K-70 Start Up Ruffing Air Blower		100%	100%	100%	0%	0%	0%	0%
NP-2030	Start Up E-60, E-61 WHSG		0%	0%	0%	0%	0%	0%	0%
NP-2031	Put C-90 Fractionation Section in Service		0%	0%	0%	0%	0%	0%	0%
NP-2032	Put Stripping Columns C-110T/B, C-111, and C-114 in Service		100%	100%	0%	0%	0%	0%	0%
NP-2033	Start Up K-130 Wet Gas Compressor		100%	0%	0%	0%	0%	0%	0%
NP-2035	Commission Plant VOC Collection System		100%	100%	100%	100%	100%	100%	100%
NP-2036	Commission Bismuth System		100%	100%	100%	100%	100%	100%	100%
NP-2037	Pull Feed System Blinds		100%	0%	0%	0%	0%	0%	0%
NP-2038	Start Up GRU		100%	0%	0%	0%	0%	0%	0%

Figure 10-5 Operating Manual Project Tracking Tool; Example of the Activity-C Detailed Spreadsheet

	Volume 2 and 3 Procedures		NP Summary		0%	EP Summary			50%
	Weight		5%	30%	30%	10%	10%	10%	5%
Procedure Number	Procedure Name	Due Date	File Developed	Data Gathered	Procedure Drafted	Technical Review	Quality Edit	Validation Review	Comments Incorporated
EP-100	Emergencies 100 - 400								
EP-101	Push BIG Red Button - FCC Unit Emergency Shutdown		100%	100%	100%	100%	100%	100%	100%
EP-105	Push LITTLE Red Button - FCC Unit Shutdown		100%	100%	100%	100%	100%	100%	100%
EP-201	Power Outage		100%	100%	100%	100%	100%	100%	100%
EP-202	Loss of Cooling Water		100%	100%	100%	100%	100%	100%	100%
EP-203	Loss of 45 psig Steam		100%	100%	100%	100%	100%	100%	100%
EP-204	Loss of 150 psig Steam		100%	100%	100%	50%	0%	0%	0%
EP-205	Loss of 500 psig Steam		100%	100%	100%	50%	0%	0%	0%
EP-206	Loss of 850 psig Steam		100%	100%	100%	50%	0%	0%	0%
EP-207	Loss of Instrument Air		100%	100%	100%	50%	0%	0%	0%
EP-208	Loss of Utility Air		100%	100%	100%	0%	0%	0%	0%
EP-301	Loss of C-90 Bottoms Reflux - P-105's		100%	100%	0%	0%	0%	0%	0%
EP-302	Loss of C-90 Bottoms Reflux Flow P-106		100%	100%	0%	0%	0%	0%	0%
EP-303	Loss of C-90 Overhead Reflux Flow P-100s		100%	100%	0%	0%	0%	0%	0%
EP-304	Loss of C-90 Sidestream Reflux Flow P-104s		100%	100%	100%	100%	20%	0%	0%
EP-305	Loss of F-70		100%	100%	100%	100%	20%	0%	0%
EP-306	Loss of HCO Flow to Tankage		100%	100%	100%	100%	50%	0%	0%
EP-307	Loss of Heavy Gasoline Flow to Storage		100%	100%	100%	100%	100%	100%	100%
EP-308	Loss of K-13A/B		100%	100%	100%	0%	0%	0%	0%
EP-309	Loss of K-70 Air Flow		100%	100%	100%	0%	0%	0%	0%
EP-310	Loss of MCO Flow to C-120/C-90 Reflux (P-118/A)		100%	100%	0%	0%	0%	0%	0%
EP-311	Loss of LCO Flow to Storage		100%	100%	0%	0%	0%	0%	0%
EP-312	Loss of Lean Sponge to C-150A		100%	100%	100%	0%	0%	0%	0%
EP-313	Loss of Light Gasoline Flow to Storage		100%	100%	100%	100%	100%	100%	100%
EP-314	Loss of MABT Air Flow		100%	100%	100%	100%	50%	0%	0%
EP-315	Loss of MCO Flow to C-120		100%	100%	0%	0%	0%	0%	0%
EP-316	Loss of MCO Flow to Storage		100%	100%	100%	0%	0%	0%	0%
EP-317	Loss of MK-50		100%	100%	100%	100%	50%	0%	0%
EP-318	Loss of S-50 Hydraulic Skid		100%	100%	100%	100%	50%	0%	0%
EP-319	Loss of S-55 Hydraulic Skid		100%	100%	100%	100%	100%	0%	0%
EP-320	Loss of S-70 Hydraulic Skid		100%	100%	100%	100%	100%	100%	100%
EP-321	Loss of S-75 Hydraulic Skid		100%	100%	0%	0%	0%	0%	0%
EP-322	Loss of S-80 Hydraulic Skid		100%	100%	0%	0%	0%	0%	0%
EP-323	Loss of Sootblower Drive Motor		100%	100%	100%	0%	0%	0%	0%
EP-324	Loss of V-100 Liquid Product Flow to E-133		100%	100%	100%	100%	100%	100%	100%
EP-325	Loss of V-100 Sour Water Storage		100%	0%	0%	0%	0%	0%	0%
EP-326	Loss of V-133 Liquid Product Flow		100%	0%	0%	0%	0%	0%	0%
EP-327	Loss of V-148 Liquid Product Flow to C-140B		100%	0%	0%	0%	0%	0%	0%
EP-328	Loss of Vacuum on E-135		100%	0%	0%	0%	0%	0%	0%
EP-329	Loss of WGC (K-130)		100%	0%	0%	0%	0%	0%	0%
EP-401	C-90 Emergency High Level		0%	0%	0%	0%	0%	0%	0%
EP-402	High Pressure in #3H2S Production Line		0%	0%	0%	0%	0%	0%	0%
EP-403	Loss of C-120 Top Reflux Flow/Feed to C-160 and C-180		0%	0%	0%	0%	0%	0%	0%

Figure 10-6 Operating Manual Project Tracking Tool; Example of the Activity-D Detailed Spreadsheet

	Volume 4 Instructor/Qualifier Guides (IQ Guides)				IQ Guide Summary				0%
	Weight		5%	30%	30%	10%	10%	10%	5%
Task ID	IQ Guide Title	Due Date	File Developed	Task Details Gathered	IQ Guide Drafted	Technical Review	Quality Edit	Validation Review	Comments Incorporated
A00	**Communication Duties**								
A01	Check Daily Order Book		100%	100%	100%	100%	100%	100%	100%
A02	Communicate Using a Radio		100%	100%	100%	100%	100%	100%	100%
A03	Give/Receive a Turnover		100%	100%	100%	100%	100%	100%	100%
A04	Communicate with Head Operator		100%	100%	100%	100%	100%	100%	20%
A05	Communicate with Shift Supervisor		100%	100%	100%	100%	100%	100%	20%
A06	Communicate with Control Board Operator		100%	100%	100%	100%	100%	100%	70%
B00	**Routine Duties 8000**								
B11	Operate H2S Sniffer		100%	100%	100%	100%	100%	100%	50%
B12	APS System Check Hot Water Trace on Lines		100%	100%	100%	100%	100%	80%	50%
B13	Cooling Water Tower Check and Control Basin Level		100%	100%	100%	100%	100%	70%	50%
B14	C-120, C-140, C-160, C-170, C-180, C-190 Check Column Relief Valves		100%	100%	100%	100%	100%	70%	0%
B15	Check and Blowdown Overhead Accumulator Sour		100%	100%	50%	0%	0%	0%	0%
B16	V-132, V-134 Check and Blowdown Vessels		100%	100%	50%	0%	0%	0%	0%
B17	E-142A, E-124, E-126, E-160A/B, E-181, E-191, E-170, E-175 Check Reboiler Pressure		100%	100%	50%	0%	0%	0%	0%
B18	# 3 H2S Plant Check Drips Tank		100%	100%	50%	0%	0%	0%	0%
B19	Check Chemical Sump in MM Plant		100%	100%	0%	0%	0%	0%	0%
B20	Conduct Pump Switches		100%	0%	0%	0%	0%	0%	0%
B21	Grease Valves		100%	0%	0%	0%	0%	0%	0%
B22	Complete Housekeeping		100%	0%	0%	0%	0%	0%	0%
B23	Locate and Reset Circuit Breakers for Electric Drives		100%	0%	0%	0%	0%	0%	0%
B24	Unplug Bleeders		100%	0%	0%	0%	0%	0%	0%
B25	Adjust Valve Packings		100%	0%	0%	0%	0%	0%	0%
B26	Replace Light Bulbs		100%	0%	0%	0%	0%	0%	0%
B27	Isolate Equipment Per Lockout/Tagout Procedures		100%	0%	0%	0%	0%	0%	0%
B28	Use Reference Materials		100%	0%	0%	0%	0%	0%	0%
B29	Accept Equipment Returned by Maintenance		100%	0%	0%	0%	0%	0%	0%
B30	Explain Rules/Procedures to Outside Contractors		100%	0%	0%	0%	0%	0%	0%

Figure 10-7 Operating Manual Project Tracking Tool; Example of the Activity-E Detailed Spreadsheet

OSHA/PSM & RMP / CalARP Compliance

APPROVED: OCTOBER 15, 2007

Richmond Industrial Safety Ordinance (RISO)

- CCHS A13-18 - "Ensure that all operating procedures are reviewed to assure that they reflect current operating practice."
- CCHS A13-19 - "Ensure that the process used to annually certify operating procedures as current and accurate reviews all procedures."

To address these findings we have:

1. Established the Electronic Manuals Management System.
2. Created a timeline and cycle to "ensure the annual certification of all procedures".
3. Created a work flow database to manage document reviews - see the Electronic Manuals Management System (EMMS) located on the left side of MOC home page.

- CCHS A13-17 - "Ensure that hard copies of emergency procedures are available in all the control rooms"

To address this finding we have:

1. Added the Head Operator Field Verification to emergency/normal procedure template and posted to the web.

2. Confirm with ABU contacts, in October of each year, using Active Learner that hard copy emergency procedures are available in the control room.

ARCHIVE:
CalARP Audit March 2006
APR Process - 2008

REVISION RECORD

Date	MOC#	Comments
2-2-2011		Added Revision Record. Converted from html to pdf.

Chevron

RICHMOND REFINERY Learning & Development

Title

Electronic Manual Management System (EMMS)

Summary

This document details the Electronic Manual Management System (EMMS) and how it is used to maintain the Electronic Operating Manual (EOM) for Operations and the Electronic Maintenance Manual (EMM) for Maintenance. The intent of this process is to provide current and accurate information as required by OSHA regulations and the Richmond Industrial Safety Ordinance (RISO).

Five Component Model Table of Contents

1. Purpose, Scope, and Objectives

1.1 PURPOSE:

The purpose of this document is to detail the Electronic Manual Management System (EMMS) process, roles and responsibilities required to ensure documents are current and accurate. This process also meets the legal requirements outlined in both the OSHA regulations and the Richmond Industrial Safety Ordinance (RISO)

1.2 SCOPE:

This process covers all documents identified as Operations & Maintenance manuals and procedures and how these documents are managed within the Electronic Manual Management System (EMMS).

1.3 OBJECTIVES:

The refinery vision is zero injuries and zero incidents. This process enables that vision by providing Operations and Maintenance with:

- Current and accurate information to operate and maintain process equipment safely, reliably and without incident.
- A method to update documents using input from operators and maintenance.
- A schedule in which operating and maintenance information is reviewed regularly

Tenets that support this process are:

- Tenet 4. Always follow safe work practices and procedures
- Tenet 9. Always follow written procedures for high risk or unusual situations
- Tenet 10. Always involve the right people in decisions that affect procedures and equipment.

2. Procedures

2.1 The minimum requirements to meet the intents of this process:

1. *Include the PSM Guidance Document defining the materials covered under this scope (PSM Guidance Document Appendix I) ensuring the annual certification of our PSM documents covers all required elements. The cycle for the review of these documents is shown in the EMMS Review Schedule (Appendix II), and PSM Certificate of Compliance (Appendix III)*
2. *Manage and maintain a database (EMMS Database) to define the refinery's review schedule, track the reviews, and audit progress.*
3. *Identify roles and responsibilities for owners of documents included in the scope and shown in Section 3.*
4. *Perform periodic checks and audits within the EMMS, to ensure we are meeting the requirements and schedule laid out in this process.*
5. *Have leading and lagging measures to assess the health of the process and set continuous improvement targets.*

2.2 Management Of Change (MOC)

MOC requires changes impacting procedures or Process Safety Information (PSI) is captured and updated prior to startup of a new or modified equipment/process. **Manuals and Procedures review each MOC to evaluate its impact on procedures.**

Updates that include a review of the entire document are captured by the Electronic Manual Management System (EMMS) Database and count toward the refinery completing its review schedule.

2.3 Reviewing procedures before and after use in the field

The most effective and efficient time to review a procedure is prior to its use. This review ensures the employees who use the procedure are clear on the expectations and that it reflects current conditions. Reviewing the procedures prior to use in combination with the Field Verification located at the end of procedures is specifically designed to document this activity was conducted.

Procedures for Start Up, Shut Down, or classified as "critical" are reviewed by the user prior to use ensuring roles, responsibilities, conditions, and changes due to unique circumstances associated with the procedure are understood, even for unplanned events.

Simple cosmetic changes to clarify procedures may be approved by the Head Operator/Mechanic and trainer.

These reviews/updates can be captured by the EMMS Database and count toward the refinery completing its review schedule.

2.4 Reviewing and validating procedures and job aids during training

Procedures and job aids used in the field as part of a training program are validated as current and accurate when used. In addition, emergency procedures are reviewed by employees as part of hypotheticals and situationals. Manuals & Procedures Team provides and manages the EMMS Database to track this review process and its progress. The business unit and/or Maintenance maintains documentation of these reviews.

2.5 Electronic Manual Management System (EMMS)

Appendix II specifies the frequency of reviews for each type of documentation. If the entire document is reviewed and validated as current and accurate, the review date is updated and the date of next review is re-set as defined in the EMMS Review Schedule.

- *Link to EMMS database*

2.6 Annual Certification of PSM required documentation

All Electronic Manual documentation in use by operations & maintenance are maintained current and accurate following the process outlined in this document For those elements of the electronic manual that require annual certification, the responsible Business Manager (RBM) completes the PSM Certificate of Compliance to document this requirement.(Appendix III)

3. Roles and Responsibilities

Role	Responsibilities and Accountabilities
Refinery Business Managers (RBM)	o Responsible for certifying that the procedures in their business unit are current and accurate annually o Provide resources to complete all reviews and updates to procedures as required under this process o Conduct periodic reviews to ensure RBU's are meeting the expectations of this model.
Operating Assistant/ Maintenance Supervisor	o Ensure procedures requiring review are completed as per the EMMS. o Track progress and ensure resources are identified and provided. Provide updates quarterly to section head, and RBM
Head Operators/ Maintenance Lead, Operators, and Maintenance Personnel	o Follow procedures o Provide feedback to trainer and M&P team on accuracy and clarity of procedures used. o Complete the field verification when procedure is used. o Actively promote the review of procedures prior to their use.
Engineers	o Review procedures for technical accuracy as requested and return to the requestor/trainer.
Trainer	o Endorse procedure changes. o Ensure the right people are involved in the review and the MOC requirements are met. Involve management and PSM group as needed.
M&P Group	o *Controls original documents and checks them out to approved individuals for updates. Ensures only approved versions are available to personnel.* o Manages EMMS process and oversees schedule. o Identifies procedures and maintains electronic manuals. o Tracks procedures, eliminates redundancy, and removes documents not in scope of EMMS. o Reviews feedback to ensure information is captured in EMMS Database o Incorporates changes to the procedures as provided by SMEs o Processes documents, applies human factors criteria, updates EMMS source folder and posts documents to web.

	o Sends Business Unit Management monthly progress reports detailing procedure review progress.
PSM Team lead	o Responsible for PSM compliance and interpretation as applied to Manuals & Procedures. Provides oversight from an MOC and PSM perspective.

4. Measurement and Verification

Leading and lagging measures will be utilized to assess the quality of implementation of this process.

These include:

Complete the following table:

Inputs / Leading →	PROCESS	Outputs / Lagging →
Number of MOCs requiring procedure updates		*Number of MOCs that had to be recycled due to deficiencies in procedure or PSI updates*
% procedural reviews completed monthly		% of reviews/field verifications completed and no errors found
Number of head operator verifications submitted		
		PSM findings in external audits due to procedural deficiencies.
		No incidents investigations identify inadequate or inaccurate procedures as causal factor.

5.Continual Improvement

2008	• 2008 APR completed 1601 reviews
2009	• Complete rewrite of this process to streamline and clarify model. • Partner with IT to update document management system. Consider SharePoint as option.

Critical Document and Record Table

Documents Critical to this Process		
1	Title	*EMMS Database*
	Description	*5 Component Model*
	Location	*Richmond Refinery MOC/PSM Web Page*
	Format	*Word.doc*
	PubDate	*5/23/2008*
	Publisher	*Learning & Development / Manuals & Procedures*
	Contact	*Adrian C. Lopez; Rosa Traylor; LaDonna Goddard*
	Retention	2160-Procedures - Safe Operations – IND
Records Critical to this Process		
1	Title	*Electronic Manuals Management System (EMMS) Database*
	Description	*Database tracks progress, changes, and completion of each review for each procedure contained within the database.*
	Location	*Richmond Refinery Web*
	Confidential	*No, database is not confidential*
	Contact	*Adrian C. Lopez for functionality. Fred Lee for tech support.*
	Format	*Access Database*
	Retention	*The complete database, including all input information, is archived annually*

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RICHMOND REFINERY Learning & Development

Administrative Information for this Process	
Item Expectations Met	Item Element 3. Safe Operations See 3.4 & 3.5 for specifics.
Linkages to other Item Process	ITEM 5CM_EMMS- Electronic Manual Management Process ITEM 4 – Management of Change ITEM 5 – Reliability and Efficiency ITEM 7 – Environmental Stewardship ITEM 8 – Product Stewardship ITEM 9 – Incident Investigation ITEM 12 – Compliance Assurance
Owner	Learning & Development Department Manager
Supervisor	PSM Compliance Coordinator
Process Resources	Three Manuals & Procedures Specialist
Links (Optional)	
Update Frequency	Three Years

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RICHMOND REFINERY Learning & Development

Revision Record

Date	Component / Topic	Comments
Jan 21, 2009	Revision Record	Added Revision Record Per Gary Ryan, removed this as an OE process and have made it a sub procedure of OE information management. Removed reference to "OE" in the title, heading blocks, and other body of the document. Deleted OE sponsor and advisor roles.
Feb.16, 2009	Major Revision – MOC - 17773	Complete rewrite of document to include improvements in the process arising from our 2007 PSM audit and our 2008 APR experience.
Mar. 26, 2009	Update	Revised model to define management of maintenance materials

Manuals and Procedures
EOM Guidebook
Appendix A

Recommended Action Verbs

Appendix A - is the industry standard for recommended action verbs used for writing technical procedures. The following rules apply when writing operating procedures or other technical material used in the Richmond Refinery.

1. Confirm the verb describes a specific action. Webster is the definitive authority; avoid common usage or industry slang.

2. Use the recommended action verb. If a verb is not recommended (usually because it is too vague), a preferred action verb is offered for use.

3. Verify the meaning of verbs commonly used in the area and establish consistent use in all procedures. For example, the verbs 'check', 'verify', and 'ensure' are frequently used interchangeably but have completely different meanings when applied to procedural instruction.

ACCOMPLISH	See PERFORM.
ACTIVATE	To formally institute a special activity or function. To place into operation.
ACTUATE	To set into action or motion, typically an automatic action.
ADD	To perform addition.
ADJUST	To manipulate a component or device.
ADVISE	See NOTIFY.
ALIGN	To adjust components as necessary to establish the designated lineup.
ALLOW	To permit a stated condition to be achieved before proceeding.
ANALYZE	To determine nature of the whole by examining parts; to examine critically.
ANNOUNCE	To make known publicly.
APPLY	To put into operation or effect.
ASSIGN	To appoint to a post or duty.
ASSUME	To take over.
ATTACH	To fasten one thing to another.
ATTEMPT	Use the precise action verb, such as "close," instead of "Attempt to close."
BACKSEAT	To adjust a valve disk against its backseat in the fully open position.
BLOCK	The act of obstructing, to hold a relay in an open or closed position.
BOLT	To attach or fasten with bolts.
BYPASS	To circumvent a safety circuit.
CALCULATE	To determine by computation.
CALIBRATE	To compare the performance characteristics of a component with an external certified standard.
CALL	See NOTIFY.

CENTER	To place in the middle of.
CHANGE	To make different in some particular.
CHECK	To inspect equipment or variable status for satisfactory condition, accuracy, safety, or performance without adjusting.
CLEAN	To remove contaminants that could interfere with a component's expected function.
CLEAR	To move people and/or objects away from an object or area.
CLOSE	To adjust or check the physical position of a mechanical device so that it prevents fluid flow or permits passage of electrical current.
COMMENCE	See INITIATE or START.
COMPLETE	To accomplish specific procedural requirements.
CONDUCT	See PERFORM.
CONFIRM	To give assurance of the validity.
CONNECT	To join or fasten together.
CONSULT	To ask for advice, to take counsel; to refer to.
CONTINUE	To do or cause to do the same thing without changing or stopping.
CONTROL	To exercise restraining or directing influence over; to fix or adjust the time, amount, or rate of; to regulate.
COORDINATE	To bring into a common action, movement, or condition; to harmonize.
CORRECT	To make or set right.
COUNT	To add together.
CUT	To sever or divide into parts.
CYCLE	To perform a process that ends where it began.
DECLARE	See ANNOUNCE.
DECREASE	To reduce, as in size, amount, number, or intensity.
DEENERGIZE	To remove the power from.
DEPRESS	To act upon through thrusting force exerted in contact; to push.
DEPRESSURIZE	To release gas or fluid pressure from.
DETERMINE	To find out; to ascertain.
DISCHARGE	To give outlet or vent to a fluid or other contents.
DISCONNECT	To sever the connection of or between.
DISCONTINUE	To cease to operate, administer, use, produce, or take.
DISPATCH	To send.
DO	See COMPLETE or PERFORM.
DRAIN	To draw off liquid gradually or completely.
DROP	See DECREASE or LOWER.
ENERGIZE	To apply voltage to.
ENSURE	To make certain that a desired condition exists, including taking necessary and appropriate actions to achieve the condition.
ENTER	To make report of; set foot in.
EQUALIZE	To make equal or uniform.

ESTABLISH	To make arrangements for a stated condition.
ESTIMATE	To judge or determine the size, extent, or nature of.
EVACUATE	Vacate an area.
EVALUATE	To assess; to determine the importance, size, or nature of; to appraise; to give a value to base on collected data.
EXAMINE	To closely monitor the condition or characteristics of an object such as a form, report, component, or device.
EXIT	To take leave, or withdraw.
EXPEDITE	To accelerate the process or progress of.
FILL	To put into as much as can be held or conveniently contained or to a specified level; to flood; to replenish.
FIND	See DETERMINE.
FLUSH	To cause to flow; to wash out or cleanse with a rush of liquid.
FOLLOW	To be or act in accordance with.
GAG	To install or initiate a restraining device that prevents operation.
GIVE	To convey to another.
GO TO	To branch to another step, section, or procedure; to proceed to.
GUIDE	To manage or direct movement of.
HAVE	To make an effort to perform, as in "Have Chemistry sample..."
HOLD	To sustain or keep, as in position or amount.
IDENTIFY	To determine; to establish the identity of.
IMPLEMENT	To carry out; to accomplish.
INCREASE	To enlarge in size, amount, number, or intensity.
INDICATE	To state or express briefly.
INFORM	To communicate knowledge or information.
INITIATE	To begin a process, usually involving several steps or actions.
INJECT	To introduce a new element; to drive a fluid.
INSERT	To put or thrust in, into, or through.
INSPECT	To measure, observe, or evaluate a feature or characteristic for comparison with specified limits.
INSTALL	To place and attach; to reinstall.
INSTRUCT	Direct or command.
INTERCHANGE	To substitute two items one for another.
INVESTIGATE	To search or inquire into.
ISOLATE	To shut off or remove from service.
JOG	To give a slight shake or push.
JUMPER	To make an electrical connection between two circuit points not normally connected; to install or remove a spoolpiece from process piping.
LABEL	To mark or identify.
LATCH	To close or fasten.
LEAVE	To cause or allow to remain in a specified condition.

LIMIT	To restrict to an amount or quantity established as the greatest permissible or to the furthest extent, range, or degree.
LIST	See RECORD. See LOG.
LOCATE	To determine or indicate a place.
LOCK	To fasten the lock of.
LOG	To enter into a record of operations or progress.
LOWER	To cause to move down.
LUBRICATE	To apply or replenish a friction-reducing substance.
MAINTAIN	To hold or keep in any particular state or condition, especially in a state of efficiency or validity.
MAKE CERTAIN	See VERIFY.
MARK	To make notations.
MINIMIZE	To reduce to the smallest amount or degree.
MONITOR	To watch, observe, or check, especially for a special purpose; to keep track of, regulate, or control the operation of.
MOVE	To change the place or position of.
NOTE	See RECORD; LOG; CHECK.
NOTIFY	To make known to; to give notice or report the occurrence of; to inform or advise; to communicate; to contact; to relay.
OBSERVE	To watch carefully.
OBTAIN	To get or attain.
OPEN	To adjust or check the physical position of a mechanical device so that it permits fluid flow or prevents passage of electric current.
OPERATE	To control equipment to accomplish a specific purpose; to cause to function.
PERFORM	To accomplish a specified action or to check that the specified action has been accomplished.
PERMIT	To allow.
PLACE	To put or set in a desired location or position.
PLOT	To represent graphically.
PLUG	To connect or become connected.
POSITION	To put in the proper or appropriate place.
PREPARE	To make ready; put in readiness.
PRESS	See DEPRESS.
PRESSURIZE	To apply pressure within by filling with gas or liquid.
PREVENT	To keep from happening.
PROCEED	See GO TO.
PROVIDE	To give.
PULL	To exert force upon so as to cause or tend to cause motion toward the force.
PURGE	To make free of an unwanted substance such as an impurity or foreign material.
PUSH	See DEPRESS.

RACK IN	To place an electrical breaker in place by physically connecting it to its associated power source.
RACK OUT	To remove an electrical breaker from service by disconnecting it from its associated power source.
RAISE	To move upward.
REALIGN	To align again.
RECALCULATE	To repeat determination by mathematical processes.
RECORD	To document a specified condition or characteristic.
REDUCE	To cause to be diminished in strength, density, or value; to decrease.
REENERGIZE	To apply a voltage to again.
REFER	To direct attention to.
REFILL	See FILL.
REGULATE	To control or restrict.
REINITIATE	See INITIATE.
REINSTALL	See INSTALL.
RELEASE	To set free from restraint or confinement.
REMOVE	To take off, move away, or eliminate.
REOPEN	See OPEN.
REPAIR	To restore a non conforming characteristic to a condition such that the capability of the item to function reliably and safely is unimpaired, even though the item still may not conform to the original requirement.
REPEAT	To make, do, or perform again; to recapitulate.
REPLACE	To put something new in the place of.
REPORT	To describe as being in a specified state.
REPOSITION	See POSITION.
REPRESSURIZE	See PRESSURIZE.
REQUEST	To ask for.
RESET	See SET.
RESTART	See START.
RESTORE	To bring back or put back into a former or original state.
RESUME	To begin again after cessation or interruption.
RETURN	To restore something to a former state or condition.
RETURN TO	To go back to a previous step in the procedure in effect.
REVIEW	To examine completed actions or documentation of completed actions to ensure that the actions were completed.
REWORK	To make a non-conforming item conform to a previously specified requirement by completion, re machining, reassemble, or other corrective means.
ROTATE	To turn about an axis or center.
RUN	To operate; to maintain or control in an operating state.
SAMPLE	To extract a small portion in order to test or judge the quality of.
SCAN	To look through or over, usually rapidly.
SEE	To refer to.

SELECT	To take by preference of fitness from a number or group; to pick out; to choose.
SEND	To direct, order, or request to go.
SET	To physically adjust an adjustable feature to a specified value.
SHAKE	To agitate.
SHIFT	To change mode of operation.
SHUT DOWN	To perform operations necessary to cause equipment to cease or suspend operation; to stop.
SILENCE	To stop making noise.
SORT	To arrange according to characteristics.
SOUND	To order, signal, or indicate by a sound.
STABILIZE	To become stable, firm, steady.
START	To originate motion of an electric or mechanical device, or to check that motion is in progress.
STATION	To assign a person to stand and remain at a certain place.
STOP	To cease motion of an electric or mechanical device, or to check that motion is NOT in progress.
STORE	To place in reserve, to hold for later use.
SUBMIT	To offer, to deliver.
SUBTRACT	To perform a subtraction.
SUPPLY	To provide; to make available.
SUSPEND	See STOP.
SURVEY	To inspect, examine.
SWITCH	To change mode of operation.
TAG	To provide with an identifying or indicating symbol (a cardboard, plastic, or metal marker used for identification or classification); to label; to attach or connect a tag to; to mark.
TAKE	Use a more precise verb. For example, instead of "Take readings," use "RECORD."
TELL	See INFORM or NOTIFY.
TERMINATE	To end, especially a process or procedure.
TEST	To measure a component's performance characteristics and to compare them with prescribed standards.
THROTTLE	To operate a valve in an intermediate position to obtain a desired flow rate for gases or liquids.
TIGHTEN	To secure a fastener using a one-arm full-strength pull with a properly sized wrench or spanner, or by using a one-hand full-strength twist with a properly sized screwdriver.
TORQUE	To secure a fastener to a specified, predetermine moment.
TRANSFER	To cause to pass from one to another.
TRIP	To activate a mechanical or electrical device to perform its intended functions, or to check that such a device is activated.
TURN	To cause to move around an axis or center.
TURN OFF	To stop the flow of or shut off.
TURN ON	To cause to operate or flow.
UNLOCK	To unfasten the lock of.
UNPLUG	To remove from a socket or receptacle.
UPDATE	To revise to include latest information or data.

USE	To avail oneself of; to employ; to utilize.
VENT	To relieve a pressure-retaining vessel of internally held gas, liquid, or pressure.
VERIFY	To confirm that an activity has been implemented or that a condition exists in conformance to the specified requirements, without directing a change in status.
WAIT	To cease action until an expected outcome or result is achieved.
WALK	To move along on foot.
WORK	To perform a task; to toil or labor.

REVISION RECORD

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1-13-2011		Added Revision Record. Convert from .html to .pdf

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Appendix B

Punctuation

Punctuation marks are listed below in alphabetical order below with correct usage. These symbols are used when writing procedures or other material for the EOM. This is standard American English punctuation.

Apostrophe - '	Comma - ,	Question Mark - ?	Semi Colon - ;
Brackets - [ ]	Hyphen -	Quotation Mark – "	Slashes - /
Colon - :	Period - .	Parentheses - ( )	

Apostrophe

1. Use an apostrophe to indicate possession:
   - The pump's impeller (this means belonging to the pump)
   - The pumps' impellers (plural)
2. An apostrophe is used to indicate a contraction (for example: can't, don't, it's). Avoid contractions in technical writing.
3. Avoid apostrophes to indicate plurals, especially with acronyms.
   - For example, use BTUs as the plural of BTU.

Brackets

1. Use brackets to avoid double sets of parentheses:
   - The electrostatic precipitator [Item (1) in Figure 2] removes fly ash from the flue gas.

Colon

1. Use a colon to indicate a series in a list:

   The alarms on the panel are:

   - High and Low Pressure
   - Low Temperature
   - High and Low Oil Reservoir Level

Comma

1. Use a comma to set off an introductory clause or phrase:
   - At the same time, the vapors contact liquid flowing down the column.
   - If the pressure is above 200 psig, open vent.
2. Use a comma to separate items in a series:
   - The voltage will vary according to the crude being processed, the temperature of the crude, and the degree of mixing required.

3. Use a comma to separate five or more digits:
   - 10,000 ppm
4. Use commas with dates as follows:
   - The January 2002, meeting...
   - The January 4, 2002, meeting...
5. Use a comma to set off the state when referring to a city and state:
   - The Richmond, California, refinery...
6. Use a comma before a conjunction between two independent clauses:
   - VRDS back flush may be re-directed, but the feed rate would be affected.

Hyphen

1. Use a dictionary as a guide for determining those words that must be hyphenated.
2. Use hyphens to indicate syllable breaks where a word must be carried over from one line to another. At least two letters must be carried over to the next line.
3. Use a hyphen in compound words with "self". For example: self-explanatory
4. Close up words (do not use a hyphen) with the following prefixes (unless misleading or awkward letter combinations result):

Pre	Su	Micro
Post	super	Mini
Re	Non	Multi

5. Use a hyphen with equipment nomenclature V-1101. Do not end a line for text with an equipment hyphen.

Parentheses

1. Use parentheses to set off explanatory or supplementary information.
   - Sodium hydroxide (NaOH)
   - Domestic Feed Tanks (9408tk and 499tk)
   - Excess washoil (overflash)

Period

1. Use a period to indicate the end of a sentence. If a list contains complete sentences, punctuate each with a period.
2. Follow numbers or letters in a list with a period:

1.	*or*	a.
2.	*or*	b.
3.	*or*	c.

3. Do not use periods in:
   - Acronyms: ATPA, not A.T.P.A.
   - Abbreviated units of measure: lb, not lb.
4. Omit the closing period in a list of items that are not complete sentences:

   The sidecuts are:
   - First sidecut (gasoline)
   - Second sidecut (jet)
   - Third sidecut (diesel)
   - Fourth sidecut (light gas oil)
   - Fifth sidecut (gas oil)

Question Mark

1. Use the question mark at the end of interrogative statements.
2. Use the question mark to punctuate the contents of decision diamonds in a flow charts.

Quotation Mark

1. Use quotation marks to set off quoted material:
   - Appendix B states, "Instructions, procedures, or drawing shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished."
2. Use quotation marks to highlight certain phrases or unusual terminology:
   - "Buzz words" or "area slang" are not appropriate in technical writing.

Semicolon

1. Use a semicolon to link two related but independent ideas in a sentence:
   - V-1101 is washed every day; the rate may vary depending on the amount of sediment.
2. Use a semicolon to separate a series of items internally punctuated with commas:
   - The refineries are located in El Segundo, California; Salt Lake City, Utah; and Pascagoula, Mississippi.

Slashes

1. Avoid using slashes in place of conjunctions:
   - Not This: temperature/pressure
   - This: temperature and pressure
2. Use slashes with units of measure: lb/hr

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Appendix C

Proofreading and Procedure Checklists

Proofreading is required whenever a document copy (hard copy) is marked up to indicate changes. Proofreading is performed whether you made the changes or a subject matter expert makes the changes. Proofreading ensures the changes were made as intended.

Do not use this checklist in place of the RISO, Human Factors checklist.

- Basic Proofreading Techniques
- Proofreading Symbols
- Review Checklists
- Narrative Writing Checklist
- Planning
- Draft
- Review
- Procedure Writing Checklist
- Format
- Step
- Conditional
- Quantitative Information
- Warnings, Cautions, and Notes
- Referencing & Branching
- Mechanics
- Graphics
- Level of Detail
- Usability
- Understandability
- Compatibility

Basic Proofreading Techniques

- Set up your proofreading environment to accommodate space for stacks of paper.
- Place the latest version on the side you write (right side for a right-handed writer).
- Use proofreading marks consistently.
- Use a red pen or other brightly colored pen.
- When you think a document is perfect, use a checklist to catch embarrassing mistakes.
- Proofread the hard copy for problems a spell checker does not catch. ("For example" instead of "for example")
- If using word processing personnel, work with the same individual(s) as often as possible. They will learn to recognize your symbols and apply the correct meaning.

Proofreading Symbols

Proofreading symbols are used to mark corrections and edits on hard copy. If there is doubt or confusion about a symbol clarify it with a word or short phrase in the margin. For example, write "CAPS" for full capital letters in addition to the triple line under the letters themselves.

Currently most word application programs offer "Spell Check" and "Grammar Check" functions, which eliminates the need for basic proofing symbols and techniques. Many use their own symbols to proof hard copy. Whatever symbols you use be sure to use them consistently and apply the same meaning with each use.

See Figure 1 Examples of Proofreading Symbols.

Symbol	Meaning	Example
No ¶	no paragraph break	"That's just the problem," he said. No ¶ "I can't find it."
¶	paragraph break	"Are you taking the bus?" she asked. ¶ "No, I'll walk," I said.
^	insert a comma	I'll need a rake, a shovel, and a bucket.
#	leave a space	these are# the wrong size.
⌒	delete a space	Put the bricks in the wheel barrow.
⌒	delete	My dog has has fleas
⌒	insert	He can't find keys. his
~	transpose	I completely am tired.
⊙	insert a period	The oven is still hot⊙
⌒ ⌒	insert quotation marks	She was singing Oh! Susanna

Figure 1 Examples of Proofreading Symbols

1. A triple line under a lowercase letter means to capitalize it.
2. A slash through an upper case letter means to make it lowercase. In addition, the letters "lc" may be written in the margin. When a series of letters is changed, slash the first letter and draw a line above the remaining letters.
3. The delete symbol (/) or s simple cross-out line means delete. In addition, the letters "del" may be written in the margin. It is also used to indicate deletion of whole steps, paragraphs, or sections by circling the text and using the delete symbol to "close" the circle.
4. The letters "sp" in the margin near a circled word, number, or symbol mean "spell out the word."
5. A wavy line under a word or phrase indicates that bold type is used.
6. Insert punctuation marks as needed:
   - Comma
   - Period
   - Semicolon
   - Colon
   - Quotation marks
   - Hyphen
   - Apostrophe
7. Insert "√ sp" next to a word that is spelled incorrectly. If the spelling is the wrong context then circle the word also. For Example: *'insure'* instead of *'ensure'*.

Review Checklists

Three checklists are used to help you perform final reviews of the operating manual materials:

- Checklist for Narrative Writing
- Procedure Writing Checklist
- Procedure Use Checklist

****Checklists are on following pages****

Narrative Writing Checklist

Planning Stage	
1. Was a system followed to generate and organize ideas? Yes No	
2. Have charts, index cards, or post-its been used to arrange ideas before outlining?	
3. Has an outline been developed to organize details related to the message?	
4. Have graphics been considered?	
5. Has a cold reader reviewed the planning device (outline/graphics)?	
Draft Stage	
1. Do the paragraphs at the beginning of chapters and sections tell the reader the subject, scope, and sequence of the information being discussed?	
2. Do topic sentences accurately describe to the reader what the paragraph will say?	
3. Do the topic sentences indicate how the points in the paragraphs will be developed?	
4. Does the main verb accurately express the important action of the subject?	
5 Is the verb in the most appropriate voice?	
6. Does the sentence structure express the logical relationship of ideas?	
7. Has the relationship of ideas been emphasized through parallel structure?	
8. Do modifying words/phrases describe the correct word?	
9. Do pronouns clearly refer to their reference (the words they replace)?	
10. Does the sentence express the idea in the most readable way?	
11. Have verbs been used instead of nouns to express action?	
12. Is technical language used appropriately?	
13. Have terms been defined, where needed?	
14. Is simple, clear, concise language been used?	
Review Stage	
1. Is a system used to review drafts?	
2. Have specific parts of the hard copy been read first to identify the overall logic and organization?	
3. Have individual paragraphs been analyzed for focus and flow?	
4. Has the draft been reviewed for sentence level problems?	
5. Are all graphics clear, appropriate, labeled?	
6. Has the document completed an ABC review process?	

****End of Narrative Writing Checklist****

Procedure Writing Checklist

Format		
1.	Are steps for each procedure task numbered or lettered in sequence from the first step through the last step of the task?	
2.	Is appropriate step hierarchy used?	
Step Construction		
1.	Are instructional steps short and concise sentences?	
2.	Is the number of actions in each instructional step limited to one or a maximum of three related actions?	
3.	Are action verbs simple and precise?	
4.	When there are three or more objects of a verb, have the objects been listed rather than embedded in a sentence?	
Conditional Statements		
1.	Do conditions come before the steps?	
2.	If there are three or more conditions are they listed vertically and are they separate from the action instruction?	
3.	Are logic words (for example, AND, OR) emphasized where needed?	
Warnings, Cautions, and Notes		
1.	Are warnings and cautions distinguished from instructions and notes?	
2.	Are notes distinguished from instructions, warnings, and cautions?	
3.	Are warnings, cautions and notes free of instructions?	
4.	Are warnings and cautions placed directly before the applicable step?	
5.	Are warnings/cautions and the applicable step on the same page?	
6.	Are notes and the applicable step on the same page?	
Quantitative Information		
1.	Are quantitative acceptance criteria provided whenever applicable?	
2.	Are ranges or nominal values with tolerance ranges specified?	
Referencing and Branching		
1.	Are referenced procedure and steps correct?	
2.	Can steps in referenced procedure be included in this procedure?	
3.	Do the instructions avoid routing users past important information such as cautions preceding the steps?	

4. Are exit conditions compatible with the entry conditions of the referenced or branched procedure?	
5. Are referencing and branching instructions correctly worded? Examples:	
Referencing	
"Refer to," "using," or "in accordance with"	
Branching	
"Go to"	
Mechanics	
1. Are standard plant-specific acronyms used?	
2. Are standard engineering units, abbreviations, and symbols used?	
3. Is spelling correct and consistent?	
4. Is capitalization used correctly and consistently?	
5. Is punctuation correct?	
6. Are methods of emphasis used sparingly?	
Procedure Graphic	
1. Are graphs, charts, tables, and data sheets legible?	
2. Is attachment formatted according to policy?	
3. Do all attachments have titles?	
4. Is the terminology used in the illustrations the same as in the procedure?	

****End of Procedure Writing Checklist****

Procedure Use Checklist

User Compatibility - Level of Detail	
1. Was sufficient information available to complete each step?	
2. Were alternatives adequately described at each decision point?	
3. Was procedure missing any information?	
4. Could the user use titles and numbers to find referenced and branched procedures?	
Understandability	
1. Was procedure easy to read?	
2. Were figures and tables easily and accurately read?	
3. Were warnings, cautions, and notes used appropriately?	
4. Did user follow branching and referencing instructions?	
5. Were procedure steps used appropriately?	
6. Could user find a particular step or set of steps when required?	
User ability to Perform Actions	
1. Could actions(s) be performed within or at designated time intervals?	
2. Could user perform procedure actions?	
Plant Compatibility	
1. Did nomenclature in the procedure agree with plant and control room labeling?	
2. Could user locate needed components?	
3. Could actions specified be performed in designated sequence?	
4. Was user able to obtain the necessary information from instrumentation?	
5. Were procedure entry conditions appropriate for symptoms seen by user?	
6. Did user have to use equipment or information not in the procedure?	
7. Did plant responses agree with procedure?	
8. Were instrument readings and tolerances consistent with the values stated in procedure?	
9. Were procedures physically compatible with work situation (not too bulky, flat space available)?	
10. Could procedure be performed with available staffing?	
11. Did procedure provide for special communication needs, such as a noisy area?	

****End of Procedure Use Checklist****

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Appendix D

Wordy Expressions and Other Loose Writing

Technical writing is short, concise and to the point; common phrases used in daily conversation is not the same as procedure writing or narrative explanation used for process description. The following table lists common phrases, the problem with using the word or phrase, and the remedy to use to correct the problem. Words are powerful. Use the correct word (remedy) to convey technically accurate meaning.

Phrase	Problem	Remedy
And/or	Leads to confusion or ambiguity.	Rewrite.
Anticipate	Simpler word available in most cases.	Use EXPECT in sense of simple expectation.
As good or better than	Poor English.	Rewrite and rearrange sentence.
Assure, ensure, insure	Confusion about proper use. All mean "to make certain or secure".	ASSURE - refers to people. INSURE- used when talking about guaranteeing life or property against risk. ENSURE – to make certain or secure
As to whether	Wordy.	WHETHER is sufficient.
As yet	Wordy.	YET is usually better.
At present	Wordy.	Use NOW.
At this time	Wordy.	Use NOW.
At this point in time	Wordy.	Use NOW.
By means of	Wordy.	Use BY.
Can	Confused with MAY.	CAN implies' ability to MAY implies' permission to
Certainly	Indiscriminate use to intensify a statement.	Eliminate and rewrite as needed.
Character	Wordy (tests of a precise character).	Eliminate and rewrite (precise tests).
Check that	Wordy	CHECK is normally enough.
Currently	If used in sense of NOW, usually redundant.	Rewrite with more precise reference to time.
Due to	Used loosely.	Only use for ATTRIBUTABLE TO.
Due to the fact that	Wordy.	Use BECAUSE.
Each and every one	Wordy.	Eliminate and rewrite.
Effect	Confused with AFFECT.	EFFECT means, "to bring about", or "result". AFFECT means, "to influence".
Ensure that	Wordy	ENSURE is normally enough.
Facility	Loose and imprecise. (Manager of the facility).	Eliminate and rewrite (Refinery Manager).
Factor	Loose and imprecise.	Rewrite and replace with something more direct.
For the purpose of	Wordy.	Use FOR or TO.
Has been provided with	Wordy.	Use HAS.
However	Avoid using to start a sentence if	Rewrite.

Phrase	Problem	Remedy
	meaning is "nevertheless".	
If conditions are such	Wordy.	Use IF.
Importantly	Poor English.	Rephrase.
In a manner similar to	Wordy.	Use LIKE.
In order to	Wordy.	Use TO.
In terms of	Wordy.	Usually best to eliminate and rewrite.
In the last analysis	Wordy and adds nothing.	Rewrite and state the conclusion.
In view of the fact that	Wordy.	Use BECAUSE.
Is equipped with	Wordy.	Use HAS.
Less	Misused for fewer.	LESS refers to quantity, mass, or bulk; FEWER means number of individuals or units.
Of the	Double preposition	Use one preposition when possible.
Only	Creates confusion.	Use ONLY immediately before the word or phrase it refers to.
Purpose of the	Wordy.	State the purpose.
Respective, Respectively	Wordy.	Can usually be omitted.
Round in shape	Wordy.	Use ROUND.
Shut down, Shutdown	Confusion.	SHUT DOWN is an action. SHUTDOWN is a condition or a noun.
Start up, Startup	Confusion.	START UP is an action. STARTUP is a condition or a noun.
Stream (e.g. gas stream)	Usually wordy	Eliminate where possible.
Subsequent to	Wordy.	Use AFTER.
Then, than	Confusion	THEN means following next in order <*walked to the door, then turned*> THAN means in comparison with or difference of kind <*older than I am*>
The fact is, the truth is	Wordy.	Rewrite to state the fact.
Through the use of	Wordy.	Use BY.
Utilize, utilization	Too fancy.	Prefer USE.
Which	Confused with THAT.	WHICH is the non-defining or non-restrictive pronoun; THAT is the defining or restrictive.
With reference to	Wordy.	Use ABOUT.
With the	Double preposition.	Use one preposition when possible.
With the object of	Wordy.	Use TO.
With the result that	Wordy.	Use SO THAT.

REVISION RECORD

Date	MOC#	Comments
1-13-2011		Added Revision Record. Converted from html to .pdf

Manuals and Procedures
EOM Guidebook
Appendix E

Descriptive Writing for EOM Volume I Process and Equipment Description

This appendix explains the descriptive writing style used for Volume I - Process and Equipment Description.

The logic to write the process and equipment description is the deductive writing process. Deductive means you start with a general idea or concept and then support that idea or concept with specific points or details.

Avoid the inductive approach to writing this volume. Inductive means you write all the facts you have assembled and then state the main point or idea; or, in the worst case, you leave the reader wondering what the main idea is.

The techniques and activities suggested in this appendix will take you from being the inductive researcher to the deductive writer.

A well-written document allows a reader to identify and understand the logical structure as easily and rapidly as possible. The **writer is responsible** to provide this structure for the reader.

The deductive technique has several advantages:

- It highlights organizational structure for the reader.
- It provides the reader with a general context before presenting specific facts. This helps the reader scan and find information quickly.

Deductive paragraphs are used at the beginning of each major unit of information to give the reader an overview of the information that will be presented. Figure 5-7 shows an example of deductive writing.

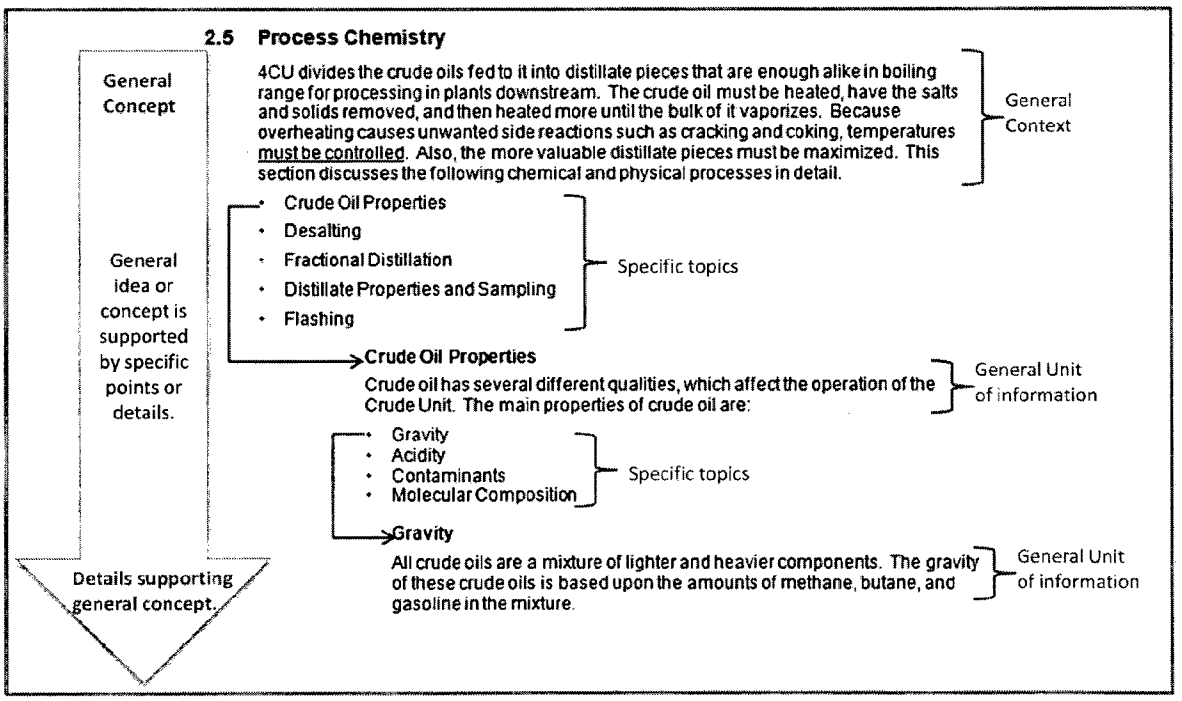


Figure 5-7 Example of deductive writing

In Figure 5-7, the first paragraph is the general context for Process Chemistry. This overview paragraph provides a high-level background of the process chemistry that will be discussed in detail. The specific topics are listed below it. Then, the first specific topic is listed and the general unit of information is written for "Crude Oil Properties" with four specific topics listed for crude oil directly below that paragraph. Finally, the general unit of information for gravity provides specific details.

This logic is repeated throughout the chapter in a deductive approach and provides the reader with the best possible frame of reference from which to learn and remember specific details. This section covers the following topics:

- Paragraph development
- Sentence construction
- Vocabulary
- Mechanics of style

Paragraph Development

The deductive paragraph, like the deductive approach to writing, is the most effective because it provides readers with a general context for the material before presenting supporting information. After readers learn the subject of the paragraph, they can better evaluate the details and how they support the subject.

For a paragraph to be effective it must have a focus and the ideas must flow easily. Focus is obtained when every sentence supports or explains the main idea stated at the beginning of the paragraph. Flow results when the sentences within the paragraph move easily from one to another, leading the reader clearly and logically through the development. This sub-section discusses the following:

- Focus
- Flow
- Linking Key Ideas
- Transition

Focus

A paragraph is focused when a main idea is developed. The main idea in technical writing is usually stated in the first sentence of the paragraph; this first sentence is called the topic sentence. Having the main idea stated in the first sentence reinforces the deductive approach because it tells the reader the topic that will be discussed. Consider the following examples:

Deductive (Present main idea in first sentence)	Inductive (Leaves the main idea to the last sentence)
Column temperature decreases progressing up the Column from the Flash Zone. Vapor advancing up the Column contacts reflux liquid (condensation) coming down from trays above. The liquid and vapor become richer in light components as they rise. Consequently, the liquid removed at the upper trays yields products with lighter boiling ranges.	**Temperature and Pressure Effect on Vaporization.** Every hydrocarbon molecule has a specific temperature at which it will vaporize for any given pressure. Progressively higher temperature will vaporize heavier and heavier molecules (those having more carbon atoms linked together). Heavier hydrocarbons will also be vaporized at a lower pressure. Therefore, it is generally desirable to conduct distillation at a relatively low pressure because it takes less heat.

Focus also means that succeeding details support and develop the subject of the topic sentence. Some of the most common methods for developing focus are:

- Details, examples, illustrations
- Cause and Effect
- Process Flow

Whatever method of development is used, the logical development of ideas must be readily apparent to the reader. All parts of the paragraph must fit together naturally and logically.

The following shows a paragraph that develops a main idea through a detail pattern.

Example of paragraph developed by using: Details and deductive logic

Stripped sour water makes up most of the balance of the Desalter make-up water. Two potential sources of stripped water to V-1109 are available. The main source is the bottoms product from C-810 Sour Water Stripper, located at the Sulfur Recovery Units. The other source is the bottoms product of the sour water stripper at C-40 Aromatics Rheniforming Unit (ARU). C-810 feeds from the LSFO sour water tank and handles all of the LSFO sour water. C-40 feeds from 480tk, which is in turn supplied by 458tk, and handles sour water from other sources in the refinery and LSFO water when C-810 is down. The water from C-40 joins the water from C-810 and is controlled by FIC-2209 (controlled by the Utilities operator and usually run wide-open) upstream of where the streams join.

The following shows a paragraph that develops a main idea through a cause and effect pattern.

**Example of paragraph developed by using:
Cause and Effect**

The pH of the Desalter water is an important factor affecting the operation of the Desalters. Water with a pH below 5.5 will corrode the effluent desalting water piping. This water will also attack the Desalter metal surfaces that are exposed by cracks in the gunnite. If the desalting water is above 7.0 pH, the emulsion cuff will be thicker and the Desalter will be about ten times less efficient at removing calcium and magnesium salts from the crude oil.

The following shows a paragraph that develops a main idea through a process flow pattern.

**Example of paragraph developed by using:
Process Flow**

Splitter Column. The C-1180 Splitter Column, illustrated in Figure 2-6, processes naphtha from V-1100 Reflux Drum that is not required for atmospheric reflux. E-1185 preheats the naphtha prior to entering the Splitter Column. E-1180 A-1 to C-2 (6) Splitter Overhead Condensers cool and condense the overhead vapor from the Splitter Column for processing in V-1180 Splitter Reflux Drum. P-1180 pumps liquid from V-1180 for reflux back to C-1180 and net overhead liquid to the Naphtha Hydrotreater (NHT). P-1185 pumps the heavy naphtha bottoms product through E-1185 and E-1186 fin fans for cooling to intermediate tankage.

Flow

Flow means the smooth movement from one idea to the next within the paragraph. The reader will often find specific pointers or guideposts helpful in easing the transition between subtopics. The following devices are commonly used to make focused paragraphs flow more easily:

- Linking key ideas
- Using transition words

Linking Key Ideas

One of the most common tools to improve flow is to repeat key words or phrases. The repetition of key words and phrases within a paragraph keeps the important ideas constantly before the reader. This is illustrated in the following example (Bolded idea is repeated):

> Two **pump around circuits** control temperatures in the middle sections of C-1100 Atmospheric Column. In the first **pump around circuit**, process liquid is pumped from tray 16, cooled in the heat exchangers, and then returned to tray 19. The second **pump around circuit** pumps from tray 34 and returns the process liquid to tray 37.

Transition Words

Transitional words, phrases, and clauses make the orderly movement from idea to idea clear to the reader. They show the exact relationship a sentence has with the one that precedes it. Common transitions and their functions are shown in Table 5-6, Transition Words.

Table 5-6 Transition Words

Function	Transition Words
Contrast	but, yet, however, nevertheless, in contrast, on the contrary, on the other hand, in spite of, conversely
Comparison	similarly, likewise, in the same way
Cause and Effect	thus, as a result, consequently, therefore, because, accordingly, on account of, due to
Time	now, then, later, soon, afterward, beforehand, next, meanwhile, at the same time, currently, earlier, during
Illustration	for example, specifically, in particular, in other words, to illustrate, that is, for instance, in effect
Generalization	in conclusion, in summary, on the whole, in general, generally
Place	here, there, at this point, below, next to, in front of, alongside, where
Addition	and, also, in addition, likewise, next, second, furthermore, moreover, besides

An example of a clear transition is shown in the following sentences:

> The Safety Manual includes information that applies directly to work at each unit, such as work permits, safety rules, and energy isolation. **In addition,** since each unit has unique features that deserve special attention, Section 5 of the Operating Manual addresses these features.

Sentence Construction

A paragraph is only as readable as the sentences it contains. An effective sentence emphasizes relationships to the main topic, offers specific and clear information, and makes for easy reading. In most cases, every sentence has a subject and a predicate. The subject, usually located at the beginning of the sentence, states who or what you are talking about. The predicate is the verb and supporting information that discusses the subject.

Sentences can be improved by applying the guidelines summarized in this section.

- Use the appropriate voice (type of sentence pattern to convey your ideas)
- Use the appropriate voice
- Avoid misplaced modifiers
- Use bullets appropriately
- Avoid unclear references
- Avoid overuse of prepositional phrases
- Avoid using noun forms of verbs
- Avoid empty subjects and verbs

Use appropriate voice

Voice provides emphasis; the two types of voice are active and passive. Generally, the active voice emphasizes the subject because the subject is at the beginning of the sentence. Passive voice emphasizes the object because the object is at the beginning of the sentence, and the subject is either at the end of the sentence or not stated. Passive voice may be more appropriate when the subject is not important or you do not know who the subject is, or you feel the subject is unimportant to the idea being developed. You must decide what information needs to be emphasized, and then select the appropriate voice.

Active Voice Structure

Subject	Verb	Object
The desalters	remove	salts and suspended solids.

Passive Voice with Subject

Object	Verb	Subject
Salts and suspended solids	are removed	by the desalters.

Passive Voice without Subject

Object	Verb	Subject
Salts and suspended solids	are removed.	

Generally speaking, you should structure sentences so that they are in active voice rather than passive voice unless the object of the action is more important than the person performing the action.

Use parallel structure

Parallel structure is using the same grammatical structure for equally important elements of information. Lack of parallelism can result in the reader being confused about the logical connections between information.

> **Example 1:** P-1165 or P-1165 A pump this vacuum residuum through the Bottoms Level control valve, through one plot limit, and to the coker plant.
>
> **Example 2:** Steam strips the liquid of lighter components, increases the distillate yield, and improves the separation between the eighth sidecut and vacuum residuum.

Avoid misplaced modifiers

Construct sentences so modifiers refer to the correct word(s). This supports human factor design.

> Improper: Referring to Figure 1-3, the Atmospheric Column represents a fractionating column where crude is separated into several components, or fractions. (The column cannot refer to Figure 1-3.)
>
> Revised: As shown in Figure 1-3, the Atmospheric represents a fractionating column where crude is separated into several components, or fractions.

Avoid unclear references

Structure sentences so that pronouns (it, this, these, which) clearly refer to their antecedents (the nouns they replace). This supports human factor design.

> Improper: Reflux is pumped into the top of the column to cool the overhead vapor, which condenses fractions with a boiling point below that of naphtha. (What does, "which" refer to - the overhead, vapor, the column, or the reflux?)
>
> Proper: Reflux is pumped into the top of the tower to cool the overhead vapor. The reflux condenses fractions with a boiling point below that of naphtha.

Always place a noun after "this" and "these," to make the reference clear to the reader.

Use bullets to simplify complex sentences or paragraphs

Write an appropriate sentence stem for parallel items and list them with bullets (or numbers if sequence is important). Use parallel structure for bullets (see above).

> Complex: The crude feed is separated into Naphtha, Kerosene, Light Oil, Heavy Oil, and Reduced Crude.

Better: The crude feed is separated into six intermediate product streams:

- Naphtha
- Kerosene
- Light Oil
- Heavy Oil
- Reduced Crude

Avoid using noun forms of verbs

Sentences are clearer and more concise when the writer uses verbs instead of nouns to describe actions.

Draft: The Head Operator needs to make a determination of the process needed.

Revised: The Head Operator determines process needed.

Avoid empty subjects and verbs

Sentences are stronger when the key information is given in the subject and verb positions. Using "it is" or "there are" to start a sentence wastes these key positions.

Draft: There are three pumps in the system.

Revised: The system has three pumps. *or* The three pumps in the system are...

Vocabulary

Your choice of words determines the quality of your writing. Keep your vocabulary simple, precise, concrete, and specific. This supports human factor design. The following topics offer guidance:

Use technical language appropriately

Clarify technical language

Use clear language

Use words correctly

Use abbreviations, acronyms, and symbols correctly

Style

Use technical language appropriately

Technical language is the special vocabulary of a subject used to precisely communicate among those knowledgeable in the field. Ensure the terms used are known and readily understood by the reader.

Determine what the word or phrase means in its simplest possible terms. If the word or phrase can be readily put into simpler terms, use the simpler terms. If not, use the technical language. The following example contains appropriate technical language:

The Vacuum Column, Pumparounds, and Side Cuts system consists of the Vacuum Column, two pumparound circuits, one pumpback circuit and three side cuts. The purpose of this system is to recover additional distillates, vacuum gas oils from the atmospheric residuum. The Vacuum Column separates vacuum column vent gas, vacuum overhead oil, light vacuum gas oils, heavy vacuum gas oils, and vacuum residuum. The Side Cuts remove the separated vacuum gas oils for processing to the VGO Unit.

Clarify technical language

Some words that are not common knowledge to less-experienced readers may need to be defined or explained in the text. The explanatory information can be included in parentheses, set off by commas, or introduced by "that is" or "which."

Example: The purpose of Flash Drum is to vaporize (flash) the water in the desalted crude.

Use clear language

Even in the most formal technical writing, clear and simple words are preferable. Avoid "deadwood expressions" by using simpler alternatives. Examples are provided in Table 5-7, Clear Language Substitutes:

Table 5-7. Clear Language Substitutes

INSTEAD OF	USE
at this point in time	now
due to the fact that	because
if conditions are such that	if
in a manner similar to	like
in view of the fact that	because
round in shape	round
subsequent to	after
utilize or utilization	use
with reference to	about
is equipped with	has
has been provided with	has

Use words correctly

Proper usage contributes to the clarity of your language. For example, the reader may be confused if "affect/effect" and "i.e./e.g." are used incorrectly. Consult a dictionary to be sure you are correct. Examples are provided below.

Affect, effect

Affect is a verb that means to influence.

Example: The low flow rate *affected* all units.

Effect can function either as a verb that means to bring about or to cause, or as a noun that means a result.

Examples: The Director *effected* several changes in the department that had a good *effect* on morale.

Avoid using effect as a verb - made, is preferable.

Assure, ensure, insure

Assure, ensure, and *insure* all mean "to make secure or certain."

Assure refers to persons, and it alone has the sense of setting a person's mind at rest.

Example: The Head Operator *assured* the Shift Supervisor that there was no risk of exposure.

Both ***ensure*** and ***insure*** mean "to make secure from harm." However, only *insure* has the connotation of guaranteeing life or property against risk and should be reserved for use only in this sense.

Examples: A systematic approach will help *ensure* a properly written procedure.

Continual, continuous

Continual means intermittent or repeated at intervals.

Continuous means without interruption in time, or of unbroken extent in space.

Compose, comprise, consist, include

Compose means "to create" or "to make up the whole" of something.

Parts *compose* (make up) a whole.

Examples: Cement, aggregate, and water (the parts) *compose* concrete (the whole).

Concrete is *composed* of cement, aggregate, and water.

Comprise means "to embrace" or "to include." The whole *comprises* the parts. Use the active voice, "comprises." The passive voice, "is comprised of," is incorrect.

Example: A botanical garden (the whole) *comprises* trees, flowers, and other plant life (the parts).

Consist means that all parts making up a whole are listed, but include does not.

Examples: Concrete *consists* of cement, aggregate, and water.

Concrete *includes* cement and aggregate.

Fewer, less

Fewer refers to units or individuals.

Less refers to mass or bulk.

Example: With the use of less powder, fewer particles result.

i.e., e.g.

i.e. means "that is."

e.g. means "for example."

Use the English equivalents to avoid misuse, overuse, pompousness, and misinterpretation.

Only

Place *only* immediately before the word or phrase it modifies. Note the difference in meaning caused by the word's location in the following sentences:

Examples: He was the *only* engineer.

He was *only* the engineer.

Presently, currently

Presently means in a short time, soon, directly. It does not mean now or at this time. To denote now, use *currently*.

Shut down, shutdown

Shut down is a verb form (action).

Examples: *Shut down* the pump (imperative). DO NOT perform maintenance until the turbine has been completely *shut down* (passive voice).

Shutdown is a noun or adjective (condition).

Examples: The plant is in a *shutdown* condition.

The procedure for plant startup and *shutdown* are being revised.

Start up, startup

Start up is the verb form (action).

Example: The corporation has received approval to *start up* the plant.

Startup is a noun or adjective (condition).

Example: The corporation has received approval for plant *startup*.

That, which

That is appropriate to restrictive (defining) clauses that are not set off by commas.

Example: The specifications *that* are in dispute (only those in dispute) have been referred to the engineer.

Which is appropriate to nonrestrictive (non-defining) clauses that are always set off by commas.
Example: The specifications, *which* are not acceptable (none of them are acceptable), have been returned to the vendor.

Via

Via is Latin for "by way of." Restrict its use to routing instructions.
Example: The mixture is sent to tankage *via* ...
Do not use *via* to mean *through* or *as the result of* outside of such contexts.

Whether, if

Whether implies a condition of doubt.
Example: He was not sure *whether* security was breached.
If implies no alternative.
Example: *If* pressure increases, open the vent.

Use abbreviations, acronyms, and symbols correctly

Improper use of acronyms can hurt the readability of your document. As a courtesy to your reader, spell out the acronym the first time the term is mentioned. For example:

- coil outlet temperature (COT)

In addition, use the following guidelines:

Avoid abbreviating words, phrases, or names unless the abbreviation or acronym is frequently and commonly used.

Use standard abbreviations for engineering units. Do not spell them at their first mention.

For example:

- Use psig, not pounds per square inch gauge.
- Be consistent in using abbreviations and acronyms. Always spell them the same way.
- To make an abbreviation plural, add a lowercase "s", with no apostrophe.

For example:

CFRs (to indicate combined feed ratios)

CFRs also means Code of Federal Regulations

Use care in selecting symbols because the reader may not readily understand the symbol. For example, some readers have difficulty interpreting > as meaning "greater than or equal to.

Some common symbols that may be used in technical writing are provided in Table 5-8, Acceptable Technical Symbols:

TABLE 5-8. ACCEPTABLE TECHNICAL SYMBOLS

Symbol	MEANING
_ ºF	Degrees Fahrenheit
_ C	Degrees Celsius
psig	Pounds per square inch gauge
scfm	standard cubic feet per minute
gpm	gallons per minute
+	plus
-	minus

Style

Styles define the appearance of various text elements of your document, such as headings, captions, and body text. When you apply a style to a paragraph or word, you can apply a whole group of character or paragraph formats or both in one simple operation. When you want to change the formatting of all the text of a particular element at once, you just change the style that's applied to that element. Styles make formatting your document easier. Additionally, they serve as building blocks for outlines and tables of contents.

Styles are also recognized by other applications or program languages and used as recognizable tags to incorporate other viewing, navigation and usability functions. This is why styles are so important for use in the EOM.

Mechanics of Style

The overriding rule in mechanics of style is consistency. Many rules are not rules at all, but style decisions. Mechanics involves the following:

- spelling
- punctuation
- capitalization
- use of numerals

Spelling

The spell check program in your word processor can be a valuable tool for detecting spelling errors in electronic copy. The program has a dictionary to which you can add new words. However, be aware of the following limitations of the spell check program:

The program does not check sentence meaning and context. For example, if you use an inappropriate word that is spelled correctly, such as "lake" instead of "like," the program will not recognize the error.

Running the program on a document with many technical terms, acronyms, and equipment designators will take more time because the program will stop at each term it does not recognize. However, you can add the technical terms to the program's dictionary.

Use the spell check program in addition to your editorial review, not as a replacement for the review.

Punctuation

Refer to the Appendix B - Punctuation Handbook

Capitalization (aka Upper Case)

Besides the hard and fast rules, such as capitalizing a proper name, most capitalization is a matter of style and consistency. When in doubt do not capitalize. Capitalization emphasizes a word too much. This clutters the document and hurts readability. And it represents 'yelling, screaming or raised voice' to the reader. Use the following guidelines.

Capitalize the first letter of the following:

- The first word in a sentence.
- The words "building," "room," "step," "figure," "form," "attachment," and similar words when used with a number (example: Step 2)
- Proper nouns, such as the company name
- Each word in official department and organizational unit names (example: Blending and Shipping).
- Each word in official job titles and functional titles (example: Shift Supervisor).
- Each word in a major system name (example: Cooling Water System).
- Principal words, including the first and the last, when referencing official document titles and headings or titles within documents (example: Section 3, Detailed Description of Equipment)

Write the following items in all capital letters:

- Switch positions exactly as they appear on control panels (example: AUTO)
- Acronyms
- Use lowercase lettering for the following:
    - Chemical element names (example: hydrogen)
    - Control indicators (example: the reset button)
    - Generic equipment and component names (examples: piping, pump)
    - Unofficial job titles in text (examples: supervisor, mechanic)

Use of numerals

The following items govern the use of numerals in technical writing:

- Basic rules
- Decimals
- Percentages
- Sentences Containing Only One Number
- Sentences Containing Two or More Numbers
- Hyphenation of Numbers

Basic rules in technical writing

- Use the Arabic numeral for units of measure, distance, and time.
- **Never** begin a sentence with a numeral

For all other cases, use the word for nine and under and the numeral for 10 and over.

Examples:

Nine and under	10 and over
4 psig	three operators
5%	10 valves
500 gpm	

Decimals

Put a zero before the decimal point in numbers less than one, but omit zeros and the decimal point unless significant digits follow the decimal point.

- 0.25 mm, 1.25 mm

Percentages

Use a percent symbol only when it is preceded by a numeral.

Sentences Containing Only One Number

If a sentence contains only one number, use a numeral if it is 10 or more; spell it out if it is less than 10. (EXCEPTION: Always spell out a number when it is the first word of a sentence.)

Preferred: Twelve 2-kg packages were stacked on each pallet.

Never: 12 packages were stacked on each pallet.

Sentences Containing Two or More Numbers

If a sentence contains two or more numbers (not units of measurement) of which at least one number is 10 or greater, use numerals for all of them. Otherwise, spell them all out. For example:

- Each of 15 major commodities, 9 metal and 6 nonmetal were available.
- Each of nine major commodities, five metal and four nonmetal, was available.

Numerals that express units of measurement or time do not affect the handling of other numbers within a sentence. For example:

Each of the five trucks traveled an average of 75 miles.

Each of the 15 trucks traveled an average of 75 miles.

Do not repeat a spelled-out number as a numeral in parentheses.

Three (3)

Spell out numbers less than 100 that precede a compound modifier containing a numeral.

twelve 2-kg packages

ninety-three 5-m-wide crates

Hyphenation of Numbers

Hyphenate between numbers and words that combine to form a unit modifier preceding the word that is modified.

1-mm diam
10-mm-diam rod (but a rod 10 mm in diameter)
five-member panel
10-fold increase

Hyphenate between the elements of spelled-out compound numbers from 21 to 99.

twenty-one
thirty-seven

Hyphenate between the numerator and denominator of a spelled-out fraction, except when one or the other already contains a hyphen.

one-half
two-thirds

REVISION RECORD

Date	MOC#	Comments
1-13-2011		Added Revision Record. Converted from html to pdf.

Manuals and Procedures
EOM Guidebook
Appendix F

Volume 1 Formats, Templates and Examples

The Process and Equipment Description manuals are written to a standard format. Templates containing the formats and styles for the manual are created. Templates are the basis and provide the following types of procedural document content:

- Table of Contents
- Chapter Content
- Generic Chapter Content

Table of Contents (TOC)

Use the table of content creator available in the software application to build the TOC. REMEMBER: TOCs are built on styles.

Chapter Content

Chapter contents are divided into usable blocks of information such as: Chapters, Sections, and subsections.

Volume 1 consists of 7 Chapters. These are:

For example:

1. Refinery Overview
2. Process Information
3. Safety Information
4. Environmental Information
5. Normal Operation
6. Environmental Information
7. Utilities

Sections are divisions within Chapters.

For example:

2.1 Process Overview

2.2 Process Streams

2.3 Feed Source

Sections can be divided into subsections.

For example:

Feed Preparation

Atmospheric Columns

The subsections are not numbered, but if needed for clarity numbering is an option.

Each template is based on pre-assigned styles for every type of line (titles, text, lines, etc.).

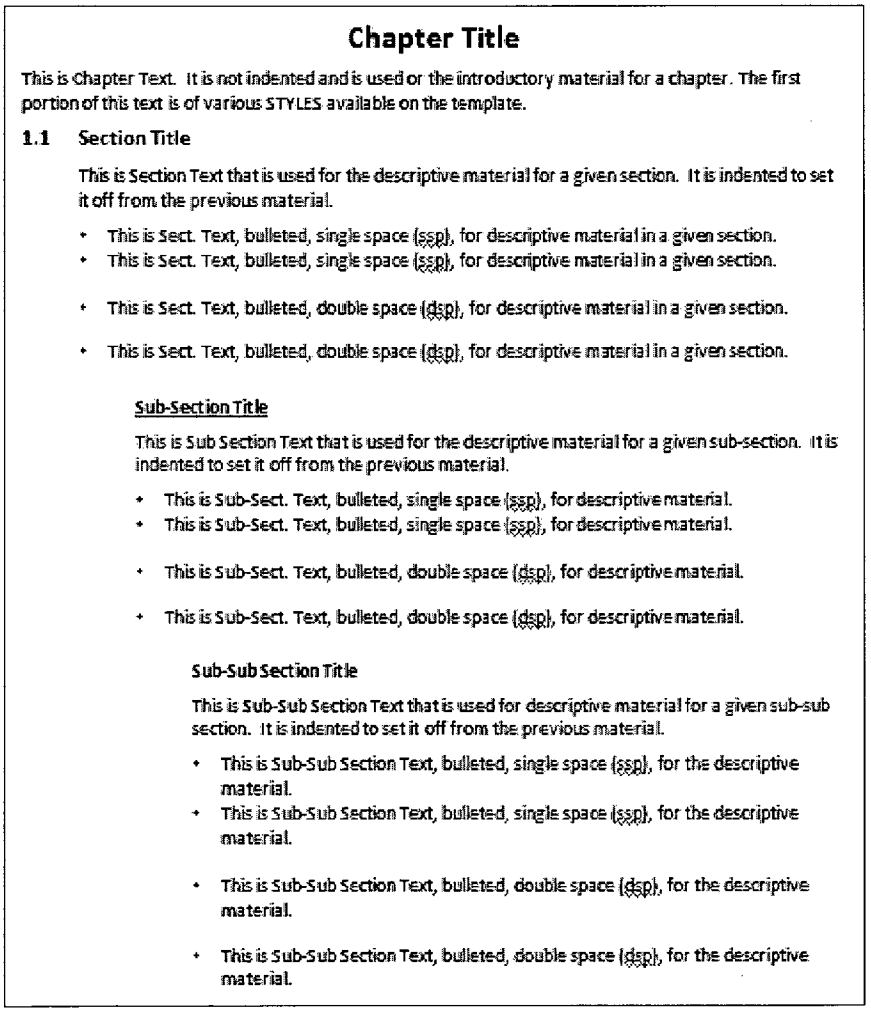
Go to the Manuals and Procedures web page and select Templates for the list of approved templates for use in the EOM.

Appendix K describes the file naming logic and identifiers used to create documents compatible with the Refinery document management system.

Generic Chapter Content

Chapters 1, 3, and 4 of the EOM have generic formats available to download from the Manuals and Procedures web page. Each area business unit can customize them to describe the particulars of their operating areas.

See the Generic Chapter Templates on the Manuals and Procedures web page. Figure 1 – shows a Sample Template used for chapters 1 thru 7.



Chapter Title

This is Chapter Text. It is not indented and is used or the introductory material for a chapter. The first portion of this text is of various STYLES available on the template.

1.1 Section Title

This is Section Text that is used for the descriptive material for a given section. It is indented to set it off from the previous material.

- This is Sect. Text, bulleted, single space (ssp), for descriptive material in a given section.
- This is Sect. Text, bulleted, single space (ssp), for descriptive material in a given section.
- This is Sect. Text, bulleted, double space (dsp), for descriptive material in a given section.
- This is Sect. Text, bulleted, double space (dsp), for descriptive material in a given section.

Sub-Section Title

This is Sub Section Text that is used for the descriptive material for a given sub-section. It is indented to set it off from the previous material.

- This is Sub-Sect. Text, bulleted, single space (ssp), for descriptive material.
- This is Sub-Sect. Text, bulleted, single space (ssp), for descriptive material.
- This is Sub-Sect. Text, bulleted, double space (dsp), for descriptive material.
- This is Sub-Sect. Text, bulleted, double space (dsp), for descriptive material.

Sub-Sub Section Title

This is Sub-Sub Section Text that is used for descriptive material for a given sub-sub section. It is indented to set it off from the previous material.

- This is Sub-Sub Section Text, bulleted, single space (ssp), for the descriptive material.
- This is Sub-Sub Section Text, bulleted, single space (ssp), for the descriptive material.
- This is Sub-Sub Section Text, bulleted, double space (dsp), for the descriptive material.
- This is Sub-Sub Section Text, bulleted, double space (dsp), for the descriptive material.

Figure 1 – Sample Template

REVISION RECORD

Date	MOC#	Comments
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Appendix G

Writing Operating and Maintenance Procedures for the Richmond Refinery

The Richmond Refinery uses an organized approach to create and write procedures. All Operations and Maintenance procedures used in the Richmond Refinery are created using the same development and writing process. The Management of Change process is followed to ensure the appropriate Subject Matter Experts (SMEs)are involved in creating a safe, well thought out, technically accurate, concise and easy to use procedure.

This appendix discusses the development process, the writing elements, and the methods used to create procedural documents and training material in the Richmond Refinery.

Development Process

The process to create and develop procedures include the following:

1) Front End Analysis (FEA) - Gathering information and review existing material
   a) Collect and Review plant and system material
   b) Conduct a job task analysis
   c) Develop a list of procedures (or other related material, job aids, checklists, guidelines) for the job or special project such as Pit Stops or Turnarounds.
2) Resolving content problems
3) Organizing the procedure
4) Writing the detailed and summary steps
5) Obtaining comprehensive reviews

Front End Analysis (FEA) - Gathering information and review existing material

The first step is to collect and review all existing material that assists the procedure writer and trainer in identifying the tasks. Material(s) to look for are:

- List of all existing procedures
- P&IDs and other drawings
- Existing training material
- System search of Network file server to obtain material from a similar plant or process.

CONDUCT A JOB TASK ANALYSIS

Once the materials are gathered include all the right people i.e., qualified subject matter experts (SMEs), process and design engineers, head operators, trainers, mechanics, instrumentation and electricians. These participants will collectively contribute to the procedure and look at all tasks associated with the procedure being developed.

The job task analysis (JTA) is performed by breaking the job down into duties, which describes the general responsibilities of the job, and tasks, which identify what the operator or maintenance person has to do to perform the job.

For each task, identification is made to characterize the criticality of the task, the frequency of performance, and the complexity of the task. The conventions for these are:

CRITICALITY		FREQUENCY		COMPLEXITY	
H =	High Criticality	R =	Rare	C =	High Complexity
M =	Moderate Criticality	O =	Occasional	M =	Medium Complexity
L =	Low Criticality	F =	Frequent	S =	Simple

Characterizations are useful for making decisions on when procedures, checklists, or job aids are needed. A numerical weight convention is helpful in determining the appropriate work instruction template to capture a task.

TOTAL	WORK INSTRUCTION TYPE
7-9	**Procedure** = In-hand work instruction used with step-by-step sign off, including initials, time and date for each required step. Completed document retained.
5-6	**Checklist** = In-hand work instruction requiring check and/or initials for each step and a signature when finalized. Completed document retained.
4 or less	**Job Aid/Template** = Not required to have written instruction while performing the task. If written, it will be in the form of a Job Aid/Guideline, an optional tool typically used by new performers or as refresher.

The weighting for each dimension (criticality, frequency, and complexity) is listed at the top of each procedure, checklist, and job aid along with the total score. This is to ensure that the appropriate template is used to capture the task. If there have been prior incidents related to a task (injury, equipment damage, environmental impact) the Business Units can elect to capture a task in a format higher on the scale (job aid scoring put into a checklist or procedure template) but it is not acceptable to move down the scale (ie. procedure scoring put into a job aid template).

Normal Procedure							Richmond Refinery
Area Business Unit Plant						Procedure Title INSERT document name here	
Criticality:	3	Frequency:	2	Complexity:	2	Total:	7	Document Type:	Procedure
Original Approval:						Date:	

These weightings are defined in the Criticality Index and are outlined in the following table.

Characterization	Guidelines	Weight
CRITICALITY:		
H =High Criticality	If performed incorrectly, consequences could reasonably be: • Fatality or a severe injury requiring hospitalization • Significant Loss of Containment (LOC), i.e., > 7 bbls of liquid hydrocarbon, > 1100 lbs. LPG, or > 55 lbs. H2S • Asset loss > $ 500K	3
M = Moderate Criticality	If performed incorrectly, consequences could reasonably be: • Recordable injury without hospitalization • Moderate LOC, i.e., 1 – 7 bbls of liquid hydrocarbon, 110 - 1100 lbs. LPG, or 5 - 55 lbs. H2S • Asset loss > $ 100K and < $ 500K	2
L = Low Criticality	If performed incorrectly, consequences could reasonably be: • First aid • Small LOC, i.e., < 1 bbl of liquid hydrocarbon, < 110 lbs LPG or < 5 lbs H2S • Asset loss < $100K	1

Characterization	Guidelines	Weight
FREQUENCY:		
R = Rare	Performed rarely, usually every six months or more (usually unpredictable).	3
O = Occasional	Performed on a periodic basis, approximately every one to three months.	2
F = Frequent	Performed regularly, at least weekly.	1

Characterization	Guidelines	Weight
COMPLEXITY:		
C = High Complexity	**Operations** - Requires the coordination of multiple Operators/process units across different sections or ABU's and typically would be expected to last longer than one shift. **Maintenance**- The use of specialty tools is required to perform task. Calculation(s) are generated or used to perform task. The task requires data collection.	3
M = Medium Complexity	**Operations**- May involve multiple Operators/process plants within the same section. Task may last more than a shift. **Maintenance** – Multiple resources required to perform task. LOTO is pre-requisite or part of task. Analog or digital value is generated or used to perform task.	2
S = Simple	**Operations**- Task performed by a single field Operator possibly in conjunction with a Control Board Operator, typically in a single process unit, and can be normally completed in one shift. **Maintenance** – Hand or standard craft tools used to perform task. Task performed by a single resource.	1

DEVELOP A LIST OF PROCEDURES (OR OTHER MATERIAL, JOB AIDS, CHECKLISTS, GUIDELINES)

Judgment is required when deciding when to create a job aid or procedure or guideline or checklist. Judgment is helped by using the weighted results from the Criticality Index shown above and Table 3.1 Criticality Index and follows the Tenets of Operation as well as the Loss Prevention System (LPS).
The following factors must be considered in addition to your judgment:

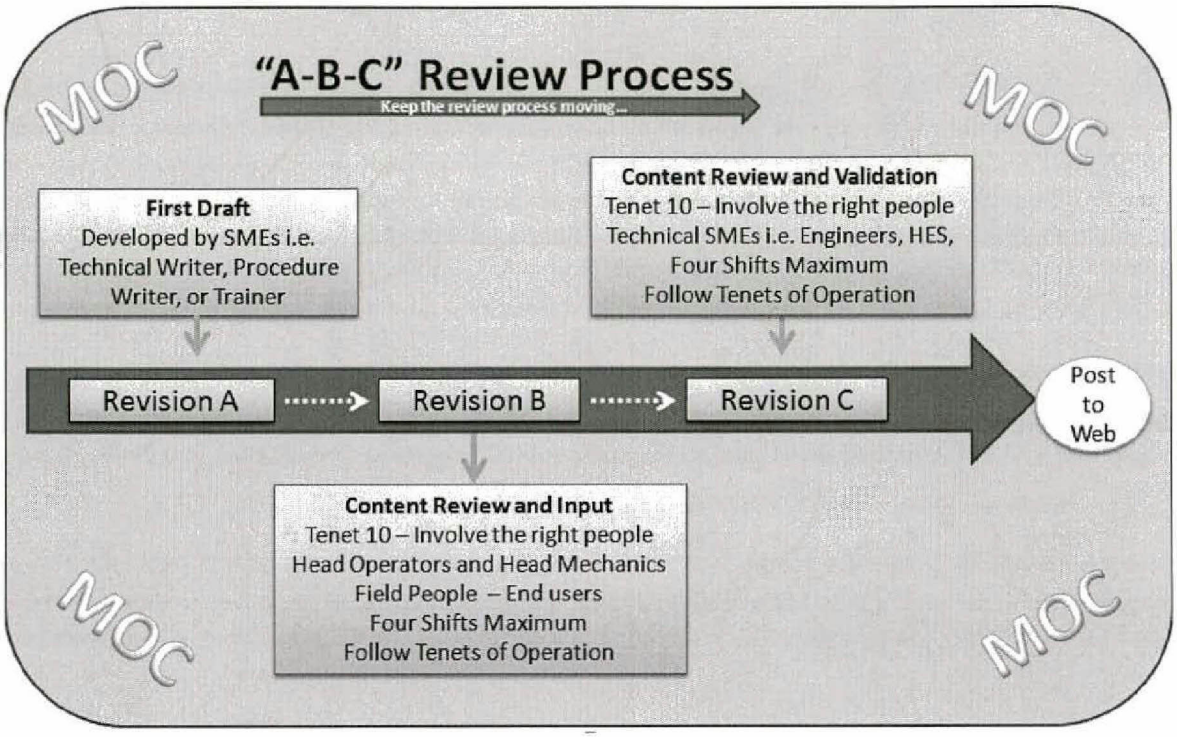
- Written procedures or checklists must be developed for the highly critical tasks. This is consistent with the OSHA requirements and is human factors driven.
- Written procedures or checklists are needed when consequences of error are severe. This is consistent with RISO.
- Written procedures or checklists are needed when the task being performed is of high complexity (multiple operators across different process units, or use of specialized tools).
- Written procedures or checklists are needed when the task is rarely performed and therefore more easily forgotten.

Nothing replaces the experience of subject matter experts, but the FEA is a critical part of procedure development because it provides decisive tools to use along with judgment factors to consider when making the decision to create a job aid, procedure, checklist or guideline.

Resolving Content Issues

Content issues frequently arise during procedure development. This is the time to involve the right people between all crews and resolve differences. Procedures are intended to show the 'safest way to do things' without compromising effective and efficient operations and maintenance processes. OSHA requires employee involvement and identifies it as an element of PSM.

The ABC Review Process enables all end users to contribute to the 'safest way to do things'. Critical judgment must be exercised and leadership decisions must be made to arrive at a resolution. Use Table 3.1 - The task criticality index.



Apply the Tenets of Operation and other guidance documents such as Refinery Instructions, Maintenance Instructions and Safe Work Practices.

Organizing the Procedure

Procedures are performed in the order the steps are written. When the job task analysis is performed the tasks are identified and usually fall out as 'logical chunks' from which detail sub steps are written.

The first draft is intended to be organized and as complete as possible when it is moved to Content Review and Input. This is part of the ABC process is frequently referred to as "Peer Review".

Writing detailed and summary steps

Logical chunks of information are divided into detail steps and sub-steps that are doable by the end user. This information comes as a result of performing a JTA which breaks down the job being performed into task priorities and task details. The detailed steps and summary steps can be used in a procedure, job aid, guideline, or checklist and is the foundation for Instructional System Design (ISD) which is the methodology adopted for training by Chevron.

Chapter 4 of the EOM Guidebook details the process for conducting a JTA for a large group or organization. JTA can also be performed on a much smaller group, or for even one job. The concepts are the same whether applied to one job or many jobs.

Obtaining Comprehensive Reviews

The ABC Review Process enables workers to participate in creating usable procedures. Human Factors Procedure Writing Checklist is applied to procedural material as well as Appendix C – Proofreading Techniques and Procedure Checklists.

The information provided as a result of completing these checklists is validated, confirmed by HES and applied to the procedure (or other document) being reviewed.

Writing Process

The procedure writing process used in the Richmond Refinery is thorough and concise. It's used to develop all procedural documents such as job aids, guidelines, and checklists as well as procedures. Each of these document types share a common format and style. Each has actions steps; each has numbered steps listed in the order to be performed; each has conditional elements that must be evaluated from an HES perspective; each must use the Human Factors Methodology for procedure writing.

Many procedural documents are used in the Electronic Operating Manual (EOM) or the Electronic Maintenance Manual (EMM) and many are not. Just because a procedure is not associated with the EOM/EMM does not mean the writing method used to develop it isn't used.

Procedures that are written using a paragraph format without the details steps listed and numbered are not approved for use in the field by operations or maintenance. Figure 1 shows an example of this style.

3) 8 or 16-Pack only

Attach plug to outlet receptacle. To check cylinder pressure open all cylinders in order, starting with no.1, while observing pressure on outlet gauge. If any cylinder reads less than 2200 psi., attach fill line to check-valve receptacle on cylinder no.1. Open fill line main valve and start compressor if necessary. (See Compressor Procedures) When filling is completed, close all cylinder valves. Close fill line valve and detach fill line from trailer. Detach plug partly from outlet receptacle to allow air to manifold to vent slowly. Monitor falling pressure on outlet gauge and note pressure at which Pak-Alarm activates (400-500 psi) and verify Pak-Alarm operation. When manifold is completely drained, detach plug. Mark fill date with chalk on fender of trailer.

This style of procedure writing is informative but not usable in the safest and most efficient and effective manner. It is difficult to follow where each detail step starts and stops; hard to know where you have left off within the procedure; conditions that are important for the end user to be aware of before they perform the step are not place before the step to which they apply – this can be dangerous for the end user in certain jobs.

Figure 2 shows the same procedure paragraph with each detail step listed in order of performance. Each step is numbered in the order in which performed. It is easy to follow, read and understand. This is a first draft so the information still needs to be validated by SMEs and the right people need to be involved to complete this procedure before it goes for peer review.

The difference between Figure 1 and Figure 2 is readily evident.

The Richmond Refinery uses the format and style shown in Figure 2.

3.	Filling 8 or 16-Pack (See Compressor Procedures)
3.1	Attach plug to outlet receptacle.
3.2	Verify cylinder pressure
3.3	While observing pressure on outlet gauge, starting at No.1, open all cylinders in order.
3.4	If any cylinder reads less than 2200 psi then attach fill line to check-valve receptacle on cylinder No.1.
3.5	Open fill line main valve and start compressor.
3.6	When filling is complete close all cylinder valves.
3.7	Close fill line valve and detach fill line from trailer.
3.8	Detach plug partly from outlet receptacle to allow air to manifold to vent slowly.
	1. Monitor falling pressure on outlet gauge and verify pressure activates between 400-500 psi.
	2. Document pressure at which Pak-Alarm activates
	3. Verify Pak-Alarm operation.
3.9	After manifold is completely drained then detach plug.
3.10	Mark fill date with chalk on fender of trailer.

Figure 2 – Detail Step Format of Paragraph Format

Procedures use and contain the following elements:

- Procedure Writing Style
- Step Numbering
- Step construction
- Human Factors
- Primary/Multi-Users
- Actions per Step
- Step Sequencing
- Informational Statements (Warnings, Cautions, and Notes)
- Referencing and Branching
- Word Choice
- Acceptance Criteria and Tolerance Ranges
- Organizing Procedure Development

Procedure writing Style

Concise writing doesn't require making every sentence short, but make every word count. Use specific, concrete and vivid detail. You can achieve economy of language by using three techniques: Avoid wordy phrases (change "until such time as" to "until"), omit meaningless modifiers (change "general consensus" to "consensus"), and prefer action verbs to nouns (change "take under consideration" to "consider"). Each technique enables you to say the same thing in fewer words, and more concise writing attracts attention of the reader.

A Microsoft Word template serves as a formatted "shell" within which you can write the required information for each procedure section. Procedure Templates are available to download from the Refinery intra-net.

Use the following specific guidelines for the style of writing used in operating procedures.

Action Step Numbering

Within the body of the procedure, action steps are numbered 1, 2, 3, etc. If sub-steps are necessary, use 1.1, 1.2, 1.3, etc. In addition, for primary user procedures task headings are shown as hanging headers in the left column of the detailed step section. These task headings help the user see the "big picture." For multi-user procedures the left column identifies who performs the detailed step.

Detail Step Signoff

Sign off at the level that states when the actual steps were performed.

The sign off allows users to keep their place in the procedure, and lets their relief know what steps have been completed and what steps remain.

For the EOM - Normal procedures are handled differently from emergency procedures. See figures 3 and 4 for detail examples.

- Figure 3, Normal Procedures Detail Signoff, displays when a detail signoff is needed for Normal Procedures.
- Figure 4, Emergency Procedures Detail Signoff, displays sign off at the Detail Step level only.

  The board operator tracks moves made in the field during an emergency.

Position	Action Steps	Sign Off
	1. Clean up V-1234	Not needed
	1.1 Flush V-1234 with BFW.	Needed
	1.2 Place operator blind in open position.	Needed
	2. Open BFW to V-1234	Needed
	3. When V-1234 is 50% full, drain V-1234 to grade.	Not needed
	3.1 Block in BFW to V-1234.	Needed
	3.2 Notify HO you are draining V-1234 to grade.	Needed
	3.3 Open V-1234 drain valve.	Needed
	3.4 When V-1234 is empty, close drain valve.	Needed
	4. Notify HO that V-1234 has been flushed and drained	Needed

Figure 3 – Sign Off for Normal Procedures

Position	Action Steps	Sign Off
	1. Clean up V-1234	Needed
	1.1 Flush V-1234 with BFW.	Not needed
	1. Place operator blind in open position.	Not needed
	2. Open BFW to V-1234	Not needed
	3. When V-1234 is 50% full, drain V-1234 to grade.	Not needed
	3.1 Block in BFW to V-1234.	Not needed
	3.2 Notify HO that you will be draining V-1234 to grade.	Not needed
	1.2 Notify HO that V-1234 has been flushed and drained	Not needed
	2. Isolate V-1234	Needed
	2.1 Block in following:	Not needed
	- V-1234 inlet	Not needed
	- V-1234 outlet	Not needed

Figure 4 – Emergency Procedure Detail Sign Off

Step Construction

1. Procedure steps should be written using simple command structure or active voice.
2. Write the procedure steps as simple command statements.
3. Each step must include only one command.
4. Begin the command with an action verb followed by the object of the action (such as the equipment name). This structure should be suitable for nearly all procedures.
5. Omit unnecessary articles (a, an, the) except where they are needed for clarity.
6. Add objects and location information as needed to convey the appropriate instructions.

Human Factors Checklist

The Human Factors Procedure Checklist is the document that ensures operating procedures use human factors methodology and meet Richmond Industrial Safety Ordinance requirements.

Primary/Multi Procedure Users

There are two types of procedure users. They are:

- Primary User
- Multi- User

PRIMARY USER (ONE)

The primary user is the person responsible for signing off as each task is complete. They perform the task. Instructions are written to the doer of the task.

Primary user procedures use present tense, active voice and command format. Most Maintenance Procedures (and guidelines) are primary user types.

MULTI-USER PROCEDURE (TWO OR MORE)

Multi-user procedures are used when the person signing off each completed task is depending on others to complete or verify that the step or task is complete. Multi-user procedures are commonly used by board operators and Emergency Procedures use special formatting described later in this section.

Multi-user procedures use active voice to identify the user responsible for the action, present tense using command format.

The left column is used to state who performs the action. Figures 3 and 4 are examples of multi-user procedures. Notice the **Position** header on the left column. This identifies 'who' performs the task.

Actions per Step

Sometimes a detail action step may include several items. Whenever possible, ensure each step contains one action.

For normal procedures the action step begins with a verb.

For emergency procedures bold capital letters in **red** are used for the action verb.

POSITION	IMMEDIATE ACTION	Sign Off
Boiler Operator	1. **SHUT DOWN** P-1185 at the boundary block.	___ ___ ___

Sometimes a step may identify several pieces of equipment. All these variations have elements of style that show the writer how to write the information in a clear, concise and understandable way. The variations and guidelines follow:

- Multiple actions per step (substeps)
- Multiple Objects of actions

MULTIPLE ACTIONS PER STEP (SUBSTEPS)

If two or three actions are related because they are done virtually simultaneously, they may be included as a step and a substep.

For example:

1. Shut down P-1165
   1.1 Block in P-1165

MULTIPLE OBJECTS OF ACTIONS

When an action verb has more than two objects, use a bulleted list instead of a list embedded in the command. If the list is more than eight items, use a table, checklist, or columns. Never use bullets for action (verbs) - only use bullets for objects (like equipment).

Use This: Shut down the following pumps:

- P-1149
- P-1159
- P-1169

Not this: Shut down pumps P-1149, P-1159, and P-1169.

Step Sequencing

Assume the doer will perform the steps in the order written. If non-sequential performance is required, indicate by explicit wording in the step. If non-sequential performance is permissible and the added flexibility aids the doer, indicate by explicit wording in the step. The following are types of step sequencing:

- Concurrent step
- Time-dependent step
- Conditional step

CONCURRENT STEP

If a concurrent step is needed for actions that MUST be performed at the same time. State specifically which steps are concurrent using terms are such as "while," "simultaneously," or "at the same time."

For example:
At the same time, open the tap and close the in – line ball valve.

TIME-DEPENDENT STEP

For a time-dependent step describe an action that is performed, within, before, or after a certain time.

For example:
After 5 minutes, vent the system.

CONDITIONAL STEPS

Conditional steps are generally of two types: "if" steps and "when" steps. Poorly written, complex, or confusing conditional steps are major causes of performance errors. Since the burden of decision making is placed on the user in this type of step, the writer must present the criteria for the decision clearly with the appropriate logic words.

IF - Use for an unexpected but possible condition.

Example:

If the pump cannot be started, then close the boundary.

When - Use "When" for an expected condition.

Example:

When the level reaches 50%, then close the boundary.

Always place the qualifying condition before the action instruction. Always have a comma following the condition.

Use This: **If** P-1175 is down, pump V-1175 with P-1198.

Not This: Pump V-1175 with P-1198 if P-1175 is down.

Use This: **When** compressor is repaired, repeat leak test.

Not This: Repeat leak test when compressor is repaired.

Informational Statements

Incorrectly written informational statements such as warnings, cautions, and notes have caused many performance errors for the following reasons:

- Experienced users familiar with the task skip informational statements because they expect the action steps be numbered sequentially. They expect information statements to contain advisory information only.
- If a step is in an informational statement box, it may not be performed.
- Safety information in notes needs to be "upgraded" to warnings or cautions.

Informational statements like 'warnings', 'cautions' and 'notes' are highly visible in procedural material and written to meet human factors methods.

WARNINGS AND CAUTIONS

Use warnings for information concerning potential personnel injury or environmental release.

Use cautions for information concerning potential equipment damage.

Specifically:

1. Place the warning or caution before the applicable step and on the same page as the step.
2. State the hazard and consequences of incorrect performance of the step.
3. Use a declarative sentence of information only.
4. Do not place action steps in warnings or cautions (direct or implied). Use of passive voice is simply a hidden instruction.

METHOD FOR WRITING CAUTIONS AND WARNINGS

First sentence: *Tell the reader what the 'bad thing' is.*

Second sentence: *Tell the reader what happens when the 'bad thing' happens.*

Figure 5 – is a Caution. Figure 6 – is a Warning.

CAUTION

A high level in V-1169B causes liquid mist carry over into K-1100B. Liquid mist entering K-1100B will damage the compressor, leading to possible line rupture, fire and explosion.

Figure 5- Caution

WARNING

Ammonia (NH_3) is a colorless, poisonous gas with a pungent, suffocating odor. Exposure to high levels of ammonia in the air may be irritating to the skin, eyes, throat, and lungs. Exposure is harmful to humans.

Figure 6- Warning

NOTES

Use Notes to provide useful information to the user.

Do not place action steps in notes.

Notes may come before or after the step depending on the information needs of the user.

NOTE: This is a note outside of a table. Do not place action steps in notes.

Referencing and Branching

This element is a wild and wooly thing and is very challenging even for the very best and most practiced technical writers. Each element is explained below:

REFERENCING

Referencing directs the user to other steps, pages, or sections within the procedure or to other procedures (either in whole or in part) to accomplish a given procedure. The user is expected to return to where they left off in referencing. The example is step 13 of a 29 step procedure.

- *Example A*: Go to ISOA7003 and complete steps 4 through 9.

BRANCHING

Branching means routing the procedure user to other procedures or to another step or section in the same procedure, but the user is not expected to return to where they left off.

- *Example A:* 2.6. If leaks not detected, go to Step 6
- *Example B:* Release equipment to maintenance per RI-9900.

Use specific verbs and phrases to indicate referencing and branching instructions to the user.

Referencing Verbs and Phrases	Branching Verbs
refer to...	go to... (forward or backward)
record on...	return to... (backward only)
...in accordance with...	exit...and go to... (for extra emphasis)
...per...	
using xxx, perform action...	
...see _____ for...	

Word Choice

Use consistent, precise action verbs. See Appendix A-Recommended Action Verbs. Some words used within the industry are listed below, along with examples of proper usage.

- Use two words when you are providing an instruction. "Start up pump."
- Use one word when used as an adjective or noun, "Startup Procedures."

Verb (An Action)	Noun or Adjective (A Condition or State)
shut down	shutdown
start up	startup
stand by	standby
cool down	cooldown
line up	lineup

Acceptance Criteria and Tolerance Ranges

Many times an operator or mechanic needs to make decisions based on acceptance criteria and tolerances. The goals of the procedure writer are to reduce the amount of interpretation a user needs to make while performing the job. If acceptance criteria are **quantitative**, use numbers instead of words. Be as specific as possible, avoiding vague words like "normal" and "satisfactory."

Quantitative: Pressurize second stage section to 75 psig.

Qualitative: Pressurize second stage section to normal.

- Specify **quantitative** values in engineering units that are the same as the units on the equipment. If conversions are needed, provide a conversion chart.
- Use values that are readable on instruments and meters. Assume that the most precision with which the user can read values is generally one-half the distance between markings.
- Ensure that acceptance criteria including the tolerance range are traceable to specific design requirements, Technical specifications, supplier data, or other verifiable data.
- Give tolerances where possible. Give nominal values and ranges in terms the user will understand. Avoid having the user perform addition and subtraction to determine the range.

For desired or nominal values, specify the value followed by a range of acceptable tolerance within parentheses.

Correct: 5.000 (4.980 to 5.020) psig

Incorrect: 5.000 + 0.4% psig

5.000 + 0.020 psig

If there is no specific desired value, provide the tolerance as a range.

Example: between 12 and 14 feet

Use percentages only when an unknown value is being calculated.

Example: Decrease flow 10% of rate in Step 4.3.

Organizing Procedure Development

Proper procedure writing requires an organized approach that includes gathering information, establishing content, and obtaining peer/crew reviews to verify procedure accuracy. An organized approach includes the following:

- Developing Front Matter for Operating Procedures
- Developing Procedure Lists
- Collecting Data to Write Procedures
- Resolving Technical Content Questions
- Organizing and Drafting Procedures
- Reviewing Procedures for Technical Content

Developing Front Matter for the Operating Procedures

A template is provided for developing the Volume II Front Matter (first page of the procedure). Generally, the front matter information will not change from unit to unit. If any additional section of procedures will be added, a numbering scheme and an explanation of the contents of that section should be added to the front matter describing the 'unfamiliar' content included in the procedure.

DEVELOPING PROCEDURE LISTS

Before writing operating procedures, you should develop a list of all the procedures that are written for the unit. An existing procedure or a job task analysis does not necessarily indicate that a procedure is required. A procedure is generally needed when one or more of the following is true:

- The task is difficult, composed of many steps, and must be done in a precise order.
- The task is complex, requires coordinating two or more operators, or requires coordinating the actions of individuals in separate areas, sections or divisions.
- The task could result in personal injury and is not a routine task.
- The task could result in equipment damage and is not a routine task.
- The task could result in environmental release and is not a routine task.

COLLECTING DATA TO WRITE PROCEDURES

Several pieces of information help when writing procedures.

Current procedures should be checked to see if they provide valuable data for writing the new ones.

Task data, collected as part of the training job task analysis, should be reviewed or performed if there is doubt. Follow Tenets of Operation and LPS.

Descriptive information and applicable engineering documentation, such as P&IDs, should be assembled before the writing process begins.

Once the information is collected, the sources must be compared, conflicts resolved, and missing pieces filled in.

RESOLVING TECHNICAL CONTENT QUESTIONS

The information in the task analysis should first be compared to the existing procedures. If any conflicts are apparent, resolve using technical experts in the system or process. If the conflict is about equipment, analyze up-to-date equipment lists and drawings, or walk-down the unit to figure out which equipment information source is accurate. Use a copy of the task analysis or the existing procedure to document the results of any findings, but use the same document to record all the findings. Use this marked up document as the basis for writing the new procedure.

A list of items to check during this comparison is provided below. It is not a complete list; use your technical knowledge or seek a subject matter expert to assess any other potential problems and determine the technical accuracy and completeness of the information.

- Are all the steps included?
- Are sub-steps included to provide clarification to steps when needed?
- Are the steps in the right order?
- Is the information in each step or set of steps provided to the same level of detail?
- Are appropriate set points and targets included in the information?

- Is appropriate information about personnel and equipment hazards included?
- Is it clear who performs the steps (Head Operator, CBO, and Outside Operator)?

Organizing and Drafting Procedures

Once all the information has been evaluated, it should be organized into a logical sequence for writing the procedure. Mark up the task analysis or current procedure to identify each step and sub-step in the sequence. Use the guidelines for formatting, review the checklists to make sure you have covered everything and then write the procedure.

Reviewing Procedures for Technical Content

Four reviews are performed to ensure that the information is technically correct, up-to-date, and formatted correctly. The technical reviews are conducted first to assure that the information is complete and ordered correctly before spending the effort to review it for formatting. The three reviews are:

- Peer Review
- Technical Verification Review
- Format Review

Peer review

After the procedure has been drafted, it should be reviewed by subject matter experts from the units to verify that the information is current and correct technically. Unit reviewers need not review for format. Comments from this review should be resolved and incorporated as appropriate.

Technical verification review

The next review is a technical verification review that is performed by the engineering group for the unit. This review ensures that the information is current and correct, and serves as a check of the initial unit review. Reviewers should focus on technical points, such as operating limits, event sequences, etc. Comments from this review should be resolved and incorporated as appropriate.

Format review

Format review is designed to ensure consistency in formatting and final production quality. The designated format reviewer will perform this review after all the technical issues have been resolved and incorporated. Comments from this review that may affect the content of the procedures will be resolved prior to incorporating them. Non-technical formatting issues will be incorporated into the document. The revision number will be made Revision 0, and the manual will be issued for approval.

REVISION RECORD

Date	MOC#	Comments
1-13-2011		Added revision record. Converted from html to pdf.
6/6/12		• Updated Criticality Index information to reflect current index components • Updated all paragraphs pertaining to use of Criticality Index to reflect new approved process • Added screenshot of new Written Instruction header including criticality scoring • Updated wording throughout document for clarification
6/22/12		• Added #3 to the section on Step Construction "Each step must include only one command" and rewrote the section on "multiple actions per step" to include the use of substeps.

Manuals and Procedures
EOM Guidebook
Appendix H

Format and Examples of Procedures

This appendix shows the county ordinance compliant format and layout of procedures and procedural documentation. It also explains the Safety Precaution requirements and the layout for Special Event Procedures and Temporary Procedures (9000 series). It contains graphics showing the different parts of the procedures and how the parts are completed.

It includes the following:

- Procedure Title and Approval Bar
- Safety Precautions (Front Matter)
- IMPACT Event Procedure Headers
- Three Column Format
- Level of Sign Off
- Warning Box and Caution Box
- Head Operator Field Verification
- Revision Records
- Figure 11 – Procedure First Page

Procedure Title and Approval Bar

Figure 1 shows the Title Block for procedures. The Title Block provides a place to enter the business unit name, plant name, procedure title and file name (or Procedure Number).

Approval Bars are only required on Procedures, Emergency Procedures, and Checklists.

The 'approval bar' shows the **Original Approval**. This cell holds the name of the person who approved the procedure. It can be the Business Unit Manager or their delegate. Typically the Section II Reviewer of the MOC is the Original Approver.

The **Date**: is the date the procedure was approved for use. This information isn't meant to change.

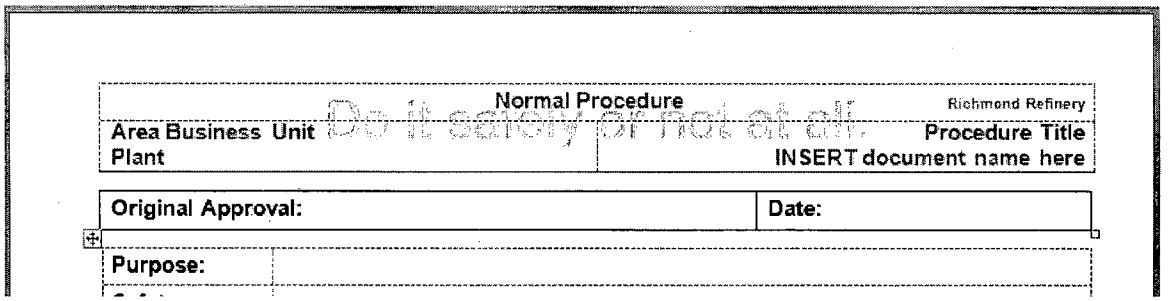


Figure 1 – Procedure Title and Original Approval (for Operations)

Templates provide standardized information designed to assist procedure writers in determining the information they might need. Writers can delete information that does not apply to their area.

Safety Precautions approved for use by the Refinery Safety Department are included in the templates. These safety precautions follow OSHA NEP Protocol as well as OSHA/PSM and CalARP. Users can delete safety precautions that do not apply to their plant.

Safety Precautions - Front Matter

The front matter of the procedure is standard information that applies to the entire procedure. The front matter of the procedure consists of the following topics:

- Safety Precautions
- Environmental Precautions
- References
- Prerequisites
- Tools (for Maintenance)

SAFETY PRECAUTIONS

Safety precautions provide notice to users about the potential hazards associated with performing the procedure (or job aid, guideline, etc.) The objective is to protect the worker.

This topic consists of the following elements:

- Special safety equipment needed to perform the procedure.
- Safety precautions specific to an individual step or plant are placed in a box immediately before the step to which it applies.
- Safety warnings that must be remembered while performing the procedure. These warnings apply to the entire procedure. There are five[1] (Big Five) safety warning statements defined by IDLH that are approved for use in the templates. These are:
  - Ammonia (NH3)
  - Benzene
  - Hydrogen Sulfide (H2S)
  - Liquefied Petroleum Gas (LPG)
  - Nitrogen (N2)

THE APPROVED VERBIAGE FOR BIG FIVE STATEMENTS FOLLOWS: (IDLH STANDARD)

Ammonia (NH_3) is a colorless, poisonous gas with a pungent, suffocating odor. Exposure to high levels of ammonia in the air may be irritating to the skin, eyes, throat, and lungs. Lung damage or death may occur after prolonged exposure to very high concentrations. Appropriate respiratory protection must be worn when working in atmospheres that have an airborne concentration of NH_3 greater than 25 ppm.

Benzene is a volatile, colorless, extremely flammable liquid with a sweet odor. Short-term exposure to high concentrations of benzene can cause breathlessness, giddiness, headaches, dizziness, or nausea. Long-term exposure may cause various blood disorders, such as anemia or leukemia (blood or bone marrow cancer). Appropriate respiratory and skin protection must be worn when working in atmospheres that have an airborne concentration of benzene greater than 1 ppm.

Hydrogen Sulfide (H_2S) is a colorless, flammable, extremely hazardous gas with a strong rotten egg odor. When exposed to H_2S, the sense of smell becomes rapidly fatigued and cannot be relied upon to warn of the continuous presence of H_2S. Its health effects can vary depending on the concentration and duration of exposure. Inhalation of low concentrations may cause headache, dizziness, and upset stomach. Very high concentrations are instantly fatal. Supplied air respiratory protection is required when working in atmospheres with H_2S concentrations greater than 5 ppm.

Liquefied Petroleum Gas (LPG) vapor clouds create the potential for fire and explosion. LPG vaporizes rapidly at ambient temperature and pressure. These vapors can quickly ignite, burn, and violently explode. LPG vapors also displace oxygen and cause an oxygen deficient atmosphere. An oxygen deficient atmosphere occurs when oxygen levels are less than 19.5%. Persons exposed to oxygen deficient atmospheres may experience adverse health effects, including headaches, lightheadedness,

[1] EPA-CalARP-Risk Management Program

unconsciousness, or death. If an LPG leak is found, immediately evacuate the area, sound the alarm, and notify the area supervisor and CFD.

Nitrogen (N_2) is an odorless, invisible, tasteless, chemically inert gas that can displace oxygen and cause an oxygen deficient atmosphere. An oxygen deficient atmosphere occurs when oxygen levels are less than 19.5%. Persons exposed to oxygen deficient atmospheres may experience adverse health effects, including headaches, lightheadedness, unconsciousness, or death. Supplied air respiratory protection is required when working in atmospheres with O_2 concentrations less than 19.5%.

The H2S safety statement must be included in the front matter of all procedures. Others may be deleted from the front matter if the hazard does not apply to that plant.

For example: ISOMAX includes H2S, NH3, and N2 in Procedures for the ISO/TKC Unit. It does not list LPG or Benzene as those safety precautions do not apply to those plants.

OTHER SPECIAL INSTRUCTIONS FOR SAFETY PRECAUTIONS (OSHA/NEP STANDARDS)

Personal or Area alarm monitors are for plants with potential H2S/NH3 exposure. The following must be included in the safety precautions for all procedures.

When a personal (or area) H_2S monitor alarms, or when you detect an odor of concern, you must:

1. Exit the area immediately
2. Move crosswind to a safe location
3. Notify your Supervisor and Operations
4. Bump test your personal H_2S monitor

The following must be included for all Start Up / Shut Down and Emergency procedures to address Removal of Non-essential personnel:

3) The following must be performed during the startup and shutdown of a plant (scheduled or unscheduled):

Ensure all non-essential personnel have been removed from the unit. This may also include adjacent operating areas, as appropriate.

- Verify any temporary buildings are not in use.
- Ensure work permits being issued during this procedure are restricted to essential activities only.
- Communicate any required work restrictions to adjacent operating unit.

Safety Precautions:	1) Personnel Protective Equipment required in operating areas. 2) The following environmental agents can be found in many of the refinery's processes and may present a safety and/or health risk if overexposed: **Hydrogen Sulfide (H_2S)** is a colorless, flammable, extremely hazardous gas with a strong rotten egg odor. When exposed to H_2S, the sense of smell becomes rapidly fatigued and cannot be relied upon to warn of the continuous presence of H_2S. Its health effects can vary depending on the concentration and duration of exposure. Inhalation of low concentrations may cause headache, dizziness, and upset stomach. Very high concentrations are instantly fatal. Supplied air respiratory protection is required when working in atmospheres with H_2S concentrations greater than 5 ppm. When a personal (or area) H_2S monitor alarms, or when you detect an odor of concern, you must: 1. Exit the area immediately 2. Move crosswind to a safe location 3. Notify your Supervisor and Operations 4. Bump test your personal H_2S monitor **Ammonia (NH_3)** is a colorless, poisonous gas with a pungent, suffocating odor. Exposure to high levels of ammonia in the air may be irritating to the skin, eyes, throat, and lungs. Lung damage or death may occur after prolonged exposure to very high concentrations. Appropriate respiratory protection must be worn when working in atmospheres that have an airborne concentration of NH_3 greater than 25 ppm. **Nitrogen (N_2)** is an odorless, invisible, tasteless, chemically inert gas that can displace oxygen and cause an oxygen deficient atmosphere. An oxygen deficient atmosphere occurs when oxygen levels are less than 19.5%. Persons exposed to oxygen deficient atmospheres may experience adverse health effects, including headaches, lightheadedness, unconsciousness, or death. Supplied air respiratory protection is required when working in atmospheres with O_2 concentrations less than 19.5%. **Liquefied Petroleum Gas (LPG)** vapor clouds create the potential for fire and explosion. LPG vaporizes rapidly at ambient temperature and pressure. These vapors can quickly ignite, burn, and violently explode. LPG vapors also displace oxygen and cause an oxygen deficient atmosphere. An oxygen deficient atmosphere occurs when oxygen levels are less than 19.5%. Persons exposed to oxygen deficient atmospheres may experience adverse health effects, including headaches, lightheadedness, unconsciousness, or death. If an LPG leak is found, immediately evacuate the area, sound the alarm, and notify the area supervisor and CFD. **Benzene** is a volatile, colorless, extremely flammable liquid with a sweet odor. Short-term exposure to high concentrations of benzene can cause breathlessness, giddiness, headaches, dizziness, or nausea. Long-term exposure may cause various blood disorders, such as anemia or leukemia (blood or bone marrow cancer). Appropriate respiratory and skin protection must be worn when working in atmospheres that have an airborne concentration of benzene greater than 1 ppm. 3) The following must be performed during the startup and shutdown of a plant (scheduled or unscheduled): Ensure all non-essential personnel have been removed from the unit. This may also include adjacent operating areas, as appropriate. ▪ Verify any temporary buildings are not in use. ▪ Ensure work permits being issued during this procedure are restricted to essential activities only. ▪ Communicate any required work restrictions to adjacent operating units.

Figure 1a- Example of Template showing IDLH approved safety statements.

Example of minimum safety precautions for a procedure, job aid, or guideline:

Safety Precautions:	1) Personnel Protective Equipment required in operating areas. 2) The following environmental agents can be found in many of the refinery's processes and may present a safety and/or health risk if overexposed: **Hydrogen Sulfide (H_2S)** is a colorless, flammable, extremely hazardous gas with a strong rotten egg odor. When exposed to H_2S, the sense of smell becomes rapidly fatigued and cannot be relied upon to warn of the continuous presence of H_2S. Its health effects can vary depending on the concentration and duration of exposure. Inhalation of low concentrations may cause headache, dizziness, and upset stomach. Very high concentrations are instantly fatal. Supplied air respiratory protection is required when working in atmospheres with H_2S concentrations greater than 5 ppm. When a personal (or area) H_2S monitor alarms, or when you detect an odor of concern, you must: 1. Exit the area immediately 2. Move crosswind to a safe location 3. Notify your Supervisor and Operations 4. Bump test your personal H_2S monitor

ENVIRONMENTAL PRECAUTIONS

This section contains environmental concerns such as discharge to sewer and venting to atmosphere. Confirm requirements for event reporting and specific tolerances using HES standards listed on Refinery intranet web page.

Examples of information included in this section are:

- Title V events i.e. RPM, CPV, PRD information
- Reg. 8 Water and Sewage information
- Special disposal requirements for hazardous waste materials.

REFERENCES

This section includes any procedures, documents, or task details the user may need while performing the procedure. Number and title identify references so the user can easily locate them.

PREREQUISITES

Prerequisites are independent actions or procedures that must be complete and plant conditions that must exist **before the procedure steps are started**. *Examples are*:

- Operability of systems and components has been confirmed before removal from service.
- The correct system or equipment configuration is in place.

TOOLS

This is most used by maintenance, but may be used by operations as well. This area lists special tools that may be required to complete this procedure, job aid, or guideline.

Impact Event Procedure Headers

Impact Event Procedure Headers use changeable header formats. Because these procedures are only used for a specific time the procedure headers must reflect the use. The headers for these procedures represent the following:

- Header formatting for USE
- Header & front matter formatting for EXPIRATION

DOCUMENT FORMATTING FOR USE

Impact Event Procedures include the following heading shown in Figure 9. The example following Figure 9 shows the header after it is completed.

Year SHUTDOWN IMPACT EVENT

Area Business Unit
Plant **IM-YR-PLANT-DOC#**

Original Approval:	Date:	Expiration Date:

Figure 9– Example for IMPACT Procedure (Volume II)

EXAMPLE of completed Impact Procedure header:

2010 SHUTDOWN IMPACT EVENT

Area Business Unit	Hydrocarbon Free Deisobutanize Section
Plant	IM10ALK3000

Original Approval: Ron Moore	Date: 10/21/2010	Expiration Date: 12/21/2010

DOCUMENT FORMATTING AFTER EXPIRATION

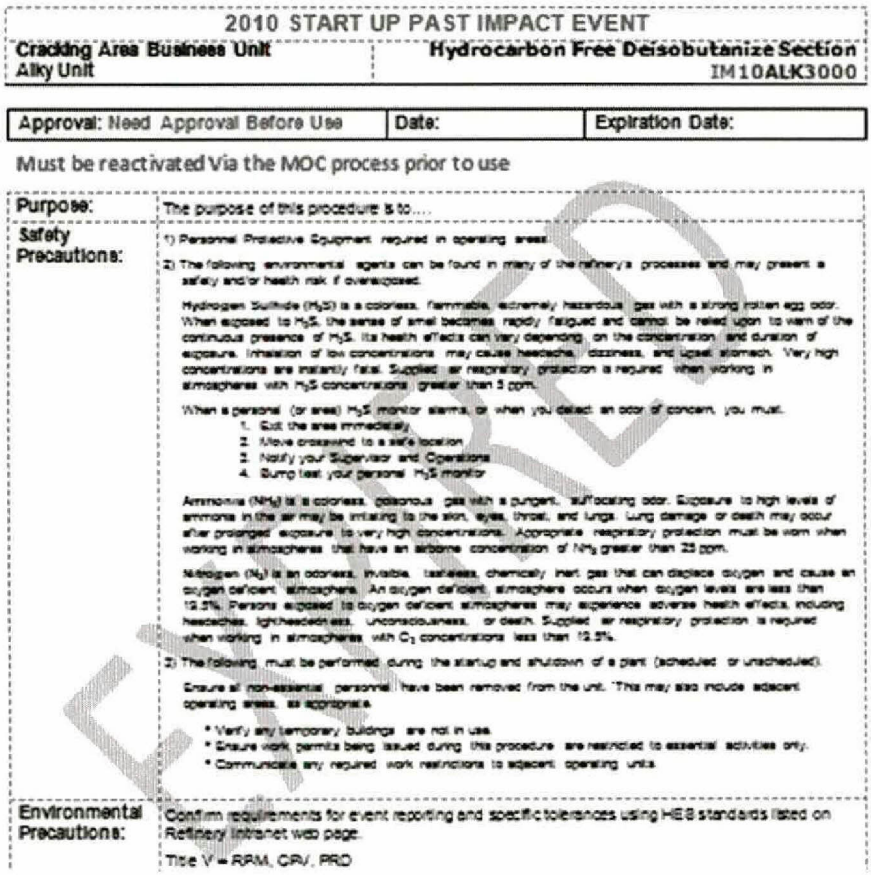
Expired Impact Event Procedure is shown in the following example. Figure 10 shows the 'Expired' Water Mark that is added to all expired IMACT procedures under the front matter.

2010 START UP PAST IMPACT EVENT

Cracking Area Business Unit Alky Unit	Hydrocarbon Free Deisobutanize Section IM10ALK3000

Approval: Need Approval Before Use	Date:	Expiration Date:

Must be reactivated Via the MOC process prior to use



2010 START UP PAST IMPACT EVENT

Cracking Area Business Unit Alky Unit	Hydrocarbon Free Deisobutanize Section IM10ALK3000

Approval: Need Approval Before Use	Date:	Expiration Date:

Must be reactivated Via the MOC process prior to use

Purpose:	The purpose of this procedure is to....
Safety Precautions:	1) Personnel Protective Equipment required in operating areas. 2) The following environmental agents can be found in many of the refinery's processes and may present a safety and/or health risk if overexposed. Hydrogen Sulfide (H_2S) is a colorless, flammable, extremely hazardous gas with a strong rotten egg odor. When exposed to H_2S, the sense of smell becomes rapidly fatigued and cannot be relied upon to warn of the continuous presence of H_2S. Its health effects can vary depending on the concentration and duration of exposure. Inhalation of low concentrations may cause headache, dizziness, and upset stomach. Very high concentrations are instantly fatal. Supplied air respiratory protection is required when working in atmospheres with H_2S concentrations greater than 5 ppm. When a personal (or area) H_2S monitor alarms, or when you detect an odor of concern, you must: 1. Exit the area immediately 2. Move crosswind to a safe location 3. Notify your Supervisor and Operations 4. Bump test your personal H_2S monitor Ammonia (NH_3) is a colorless, poisonous gas with a pungent, suffocating odor. Exposure to high levels of ammonia in the air may be irritating to the skin, eyes, throat, and lungs. Lung damage or death may occur after prolonged exposure to very high concentrations. Appropriate respiratory protection must be worn when working in atmospheres that have an airborne concentration of NH_3 greater than 25 ppm. Nitrogen (N_2) is an odorless, invisible, tasteless, chemically inert gas that can displace oxygen and cause an oxygen deficient atmosphere. An oxygen deficient atmosphere occurs when oxygen levels are less than 19.5%. Persons exposed to oxygen deficient atmospheres may experience adverse health effects, including headaches, lightheadedness, unconsciousness, or death. Supplied air respiratory protection is required when working in atmospheres with O_2 concentrations less than 19.5%. 3) The following must be performed during the startup and shutdown of a plant (scheduled or unscheduled). Ensure all non-essential personnel have been removed from the unit. This may also include adjacent operating areas, as appropriate. * Verify any temporary buildings are not in use. * Ensure work permits being issued during this procedure are restricted to essential activities only. * Communicate any required work restrictions to adjacent operating units.
Environmental Precautions:	Confirm requirements for event reporting and specific tolerances using HES standards listed on Refinery Intranet web page. Title V = RAM, CRV, PRD

Figure 10 – Example of Expired IMPACT Procedure (Volume II)

Three Column Format

The following is an example of a multi-user procedure with a three column format. The procedure template is designed to allow the writer to fill in the information according to the county ordinance standards for writing procedures. The columns are:

- Position
- Action
- Sign off

Detail Procedure:		
Position	**Action**	**Initial Date Time**
		____ ____ ____
		____ ____ ____
		____ ____ ____

POSITION

The first row on the left is the Position. This clearly identifies the person responsible for completing a particular step. This is a compliance item for the county. The style used is hanging header.

ACTION

This column lists the detailed steps, sub-steps, sub-sub steps for each step in the procedure. Actions are written in a basic outline format and when scanned quickly by the user it provides an excellent "quick reference" list. This format is compliant with the county ordinance.

SIGN OFF

This space is used to track where the user is in the procedure and for knowing when the step is complete. This format is compliant with the county ordinance.

A single-user procedure uses a two column format that lists the Action and the sign off. Since the procedure is written to just one user, the position column is removed. The procedure template is designed like this to allow the writer to fill in the information required.

Level of Sign Off

Sign-off at the level that states the actual steps performed to carry out a task.

The sign-off allows users to keep their place in the procedure, or lets their relief know what procedural steps have been completed, and what tasks remain.

When no sign-off is necessary, the three detail sign-off lines are not needed. Figure 3 and 4 show the approved level of sign off for Normal Procedures and Emergency Procedures.

Position	Action Steps	Sign Off
	1. Clean up V-1234	Not needed
	1.1 Flush V-1234 with BFW.	Not needed
	1.2 Place operator blind in open position.	Needed
	2. Open BFW to V-1234	Needed
	3. When V-1234 is 50% full, drain V-1234 to grade.	Not needed
	3.1 Block in BFW to V-1234.	Needed
	3.2 Notify HO you are draining V-1234 to grade.	Needed
	3.3 Open V-1234 drain valve.	Needed
	3.4 When V-1234 is empty, close drain valve.	Needed
	4. Notify HO that V-1234 has been flushed and drained	Needed

Figure 3 – Sign Off for Normal Procedures

Position	Action Steps	Sign Off
	1. Clean up V-1234	Needed
	1.1 Flush V-1234 with BFW.	Not needed
	1. Place operator blind in open position.	Not needed
	2. Open BFW to V-1234	Not needed
	3. When V-1234 is 50% full, drain V-1234 to grade.	Not needed
	3.1 Block in BFW to V-1234.	Not needed
	3.2 Notify HO that you will be draining V-1234 to grade.	Not needed
	1.2 Notify HO that V-1234 has been flushed and drained	Not needed
	2. Isolate V-1234	Needed
	2.1 Block in following:	Not needed
	- V-1234 inlet	Not needed
	- V-1234 outlet	Not needed

Figure 4 – Emergency Procedure Detail Sign Off

Warning Box and Caution Box

Procedures use breaks in the actions to indicate special conditions that impact user safety, environmental releases, called warnings and cautions; and additional nice to know information, called notes. The formatting for a warning box and its text differs from a caution box. This formatting is compliant with county ordinance requirements. Figure 5 and 6 show the boxes. Below the figure is the explanation for each.

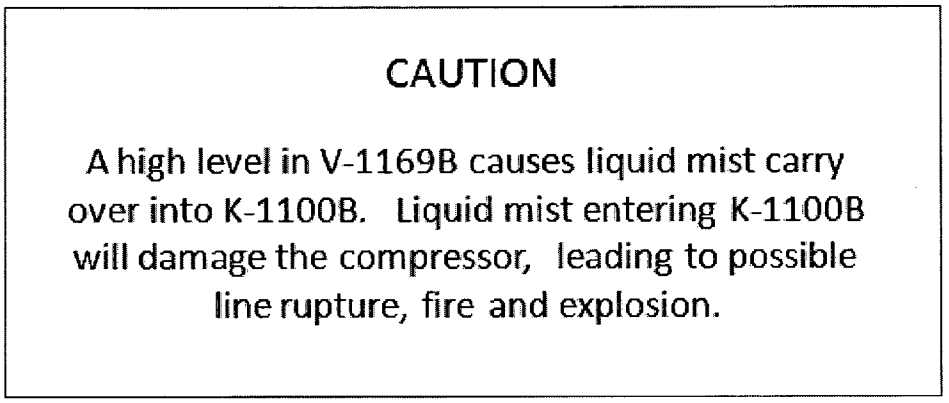


Figure 5- Caution

A caution box is a single line box, located in the center of the page. The word 'CAUTION' is in upper case (capital letters). The text explaining the meaning of the caution is centered inside the box using sentence case.

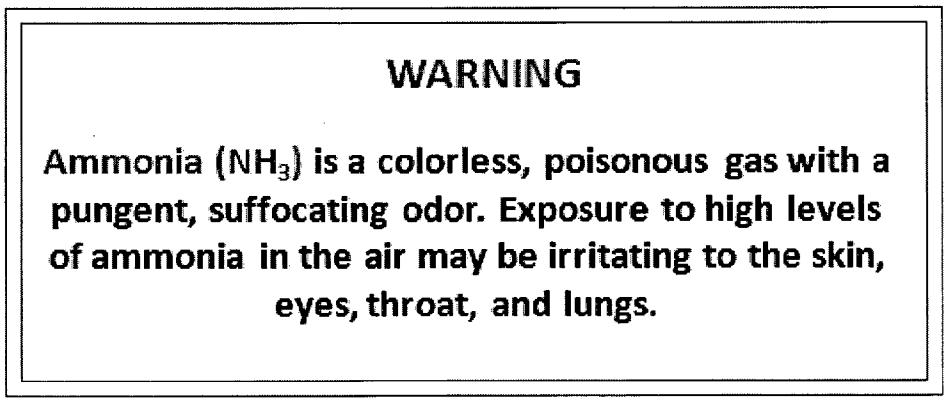


Figure 6- Warning

A warning box uses a double line box, located in the center of the page. The word 'WARNING' is bold and in upper case (capital letters). It can be red (as shown) or black. The text explaining the meaning of the warning is bold and centered inside the box using sentence case. Red text can be used to highlight the item being warned about. As shown, Ammonia (NH3) is in red.

These boxes are included as automatic inserts (or macros) in the templates.

Head Operator Field Verification

The Head Operator Field Verification (H.O. Field Verification) is added to all procedures and checklists. This is added for end user convenience and is a great way to have 'red-line' mark ups approved.

1. Open an MOC
2. Add the information from this review into the EMMS database include the MOC#.
3. Send document to Manuals & Procedures for processing.

HO Field Verification Table

Position	Action	√	Initial
Head Operator			
1.	Select one of the following conditions that apply to this document:		
1a.	All portions of this document are complete and field verified as correct.		
1b.	All portions of this document were completed as applicable with exceptions noted (due to transmitter failures, step not needed, etc.).		
1c.	This document will be revised based upon field verification. The suggested revisions are noted and have been submitted for correction.		
Management Representative			
2.	This document was implemented and completed according to ABU guidelines.		

2. Field verification is completed for each document requiring yearly review.
   Head Operator actions:
   2.a The Head Operator completes Field Verification Table and assigns a condition.
   2.b Depending on the condition do one of the following:

Condition 1a:	Deliver document to Management Representative.
Condition 1b:	Red line the document providing explanation for exceptions. Deliver to Management Representative.
Condition 1c:	Red line the document indicating changes or updates that reflect current operating practice. Deliver to Management Representative.

3. **Management Representative actions.**
   1. Ensure revisions, updates and / or changes are red lined in the document and forward to Manuals and Procedures to include in EOM. This document will be returned to your location for filing.
   2. Ensure MOC is used to manage procedural step changes.

****End of Detailed Procedure****

Revision Records

Revision Records are included on all procedural documents. Each time a change is made to a procedure, job aid, checklist, guideline or other procedural document the change is documented in the revision record. This shows the user the changes that have been made to the document and acts as a historical record of the document.

Revision Record

Date	Step #	MOC#	Comments
2-14-2007		XXXXX	Enter document changes here. Be as specific as possible.

Figure 11 – First Page of Procedure

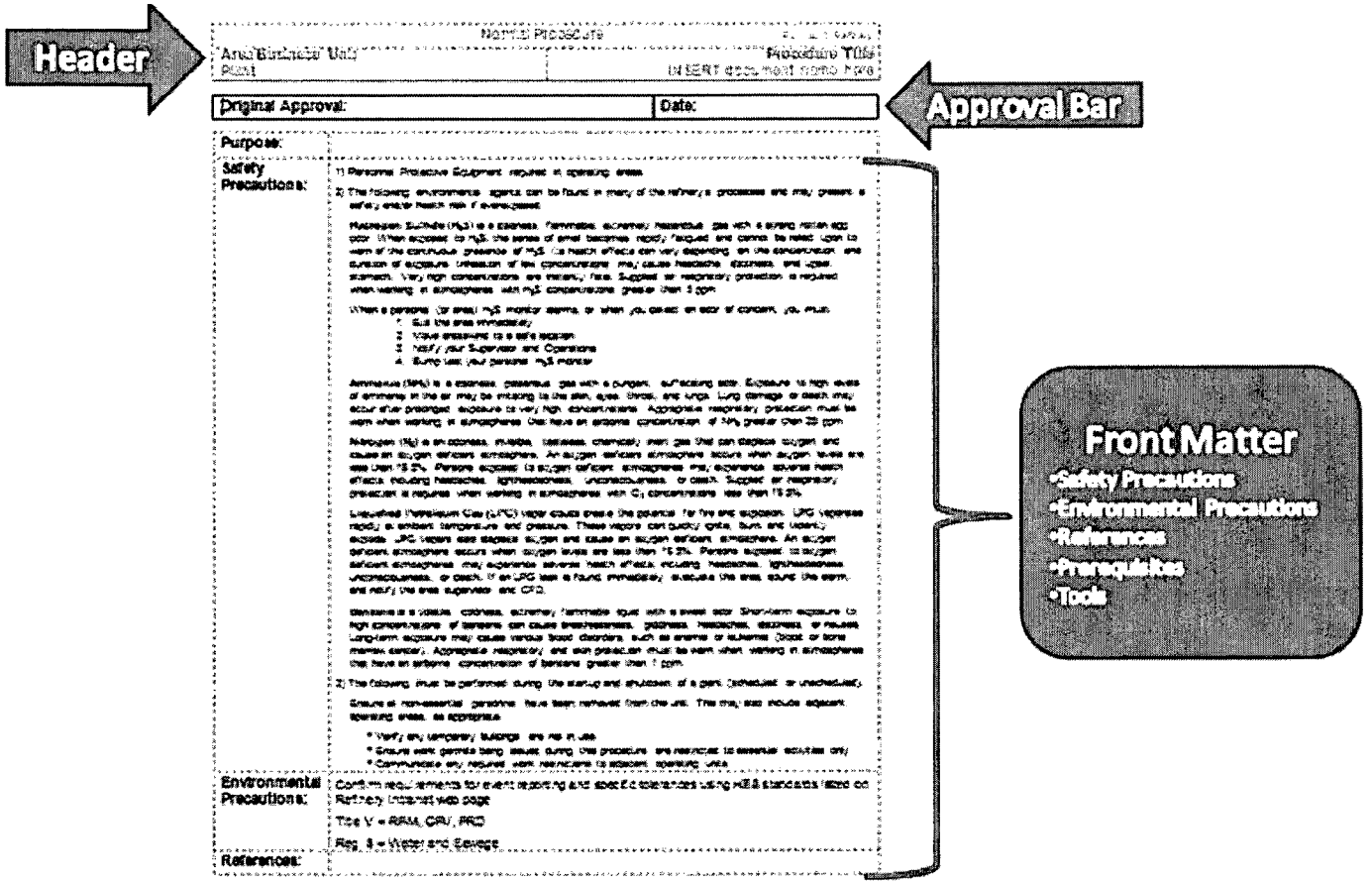


Figure 11 - Procedure – First Page

REVISION RECORD

Date	MOC#	Comments
1-17-2011		Added Revision Record. Converted from html to pdf.

Manuals and Procedures
EOM Guidebook
Appendix I

Writing Emergency Procedures

Emergency Procedures use several different design elements that set them apart from Normal Procedures. Emergency Procedures look different from Normal Procedures because they are critical to process operations and need to be recognized immediately as being different.

Appendix G – Writing Operating Procedures and Appendix H – Formatting Operating Procedures show the basic elements to follow when writing procedures and many of these elements apply to emergency procedures. Go to Appendix J – Format and Examples, to see how emergency procedures are designed.

When developing emergency procedures proper procedure writing requires a systematic, organized approach from the first step of gathering data to the final review and approval.
This appendix includes:

- Create Summary Steps for First Page from detail steps
- Summary Section (First Page)
- After first page – Use three column format
- Detail step formatting
- Reviewing Procedures for Technical Content
- [1]A. Gathering Data to Prepare for Writing Procedures
- B. Developing Procedure Lists
- C. Developing Front Matter for the Emergency Procedures Volume
- D. Resolving Technical Content Questions
- E. Organizing and Drafting Procedures

Create Summary Steps on first Page from detail steps

Once the procedure has been written, the summary section is created. This section is developed by taking the steps from the immediate actions section and placing them in the left cell of the summary section page, and the steps from the stabilizing action and placing them in the right cell of the summary section page.

Basically, Emergency procedures use the layout and step detail of a normal procedure with more detail and action sections. See Appendix G – Writing Operating Procedures for the EOM for details.

Each procedure contains the necessary steps to bring the unit to a safe condition, and then stabilize it, and then lists exit steps in preparation to bring the unit back to normal condition. To manage the information the procedures are formatted by dividing it into three sections that represent the conditions of emergencies.

[1] In this appendix Items A through E reflect the original development process for the EOM Project in 1992. This information is retained for historical reference.

The divisions of each section are:

- Immediate Actions
- Stabilizing Actions
- Exit Actions

IMMEDIATE ACTIONS

These are the actions that must be taken from the identifying the emergency to bringing the unit to a safe condition. These actions may be carried out in any order unless a specific order is called for in the procedure steps. Immediate Actions include OSHA NEP Protocol for removing non-essential personnel from operating area. Notifications are listed in prioritized order established by business unit to address plant specific considerations.

STABILIZING ACTIONS

These are the actions carried out after the unit is in a safe condition. These actions are designed to stabilize the unit so that it can be returned to normal conditions in a safe and orderly manner. At the conclusion of these actions, the unit should be able to remain in its final condition long enough to make an informed decision about how to recover the unit and develop a plan to recover.

EXIT ACTIONS

These are the actions that will be required to align the unit conditions to those required for recovery to normal. These actions are based on the final desired condition of the unit, that is, started up or shut down. The condition and the required actions are listed in this section of the procedure.

First, create the detailed step sections of the emergency procedures to identify:

- Detailed immediate actions
- Detailed stabilizing actions
- Detailed exit actions

By developing this content first it makes it very easy to develop the Summary actions listed on the first page.

Summary Actions (First Page)

Second, use the detailed section, to easily create the summary steps listed on the first page of the emergency procedure for:

- Summary immediate actions
- Summary stabilizing actions

The summary actions are on the first page of an emergency procedure. This page is a list of the major steps required to bring the unit to a stable condition. The page is intended to quickly capture the logical order of detail steps need to bring the unit out of the emergency and into a stable condition.

The numbered steps on this page must match the supporting pages – exactly. This is defined by human factors and PSM. Step 5 on this page must be Step 5 shown on page 3.

Third, exit actions are left out of the summary section to better ensure that the summary section of the procedure would fit on one page. The main reason to have a one-page version is to serve as a quick reference for the operating console for actions requiring urgent attention. A sense of urgency does not usually apply to exit actions.

If space permits in the summary section, start the immediate actions in the left column and start the stabilizing actions in the right column.

If space does not permit, start the stabilizing actions just below where the immediate actions end in the left column.

Use the Word templates on Manuals/Procedures web page to create the emergency procedures.

After first page - Use three columns procedure format

The left column in the immediate actions and stabilizing actions sections contains the title of the operator responsible for carrying out the action listed in the step. The operator's title is placed in the left column. When the person performing the task changes, change the operator title to coordinate with the step; do not repeat position title until position changes.

In the exit actions, the left column identifies the condition that the unit will be brought to by the actions listed in the right column. This column appears in larger, bold print as a quick reference to the operator.

The middle column in the three-detailed step sections always contains the concise steps, sub-steps, and sub-sub-steps required to operate the unit.

The right column contains sign-off lines for the operator's initials, date, and time. This is used as a checklist to confirm that all appropriate actions have been taken.

Step format identifiers

Each step used present tense, active voice, and command format. See Appendix K – Writing Operating Procedures for details. For each detail step the action verb is **BOLDED** and ALL UPPER CASE (or CAPITAL LETTERS). Sub-steps are not bolded.

Decision conditions, location information, and references to other necessary information may also be included in the step. Where possible, criteria for determining that the action identified in the step was successful should be identified. For example, "**PUMP** V-1100 level to 12 feet" gives specific instruction on how much to pump out of or in to the vessel.

- The steps used in the immediate action and stabilizing action sections are collected in the summary section at the beginning of the procedure after the detailed step section is complete.
- All steps for the immediate actions should fit in the left-hand column of the summary section.
- For stabilizing actions, use the right hand column if possible; otherwise start stabilizing actions just below immediate actions in the left column.

- When writing steps, look carefully at the procedure to see if a set of steps fits into a logical group.
- Write the step to summarize the actions, and then use sub-steps to concisely define the sequence of sub-steps for the task.
- Step number 6 on the first page must be step number 6 on the detail step page. This applies to all steps.
- The wording of the step must clearly define what the action is for an experienced operator, because sub-steps will not appear in the first page.
- When a step contains more than two separate actions, use sub-steps.
- If the same action is carried out on a list of more than two items, such as opening several valves then use bullets to list the valve names.
- Use sub-step numbers on the valve names if they must be opened in a specific order.

Reviewing Procedures for Technical Content

There are three types of reviews performed to assure that the information is technically correct, up-to-date, and formatted correctly. The technical reviews are conducted first to assure that the information is complete and ordered correctly before spending the effort to review it for formatting. The ABC Review Process captures the following three review types:

- Peer Review
- Technical Verification Review
- Format Review

PEER REVIEW

After the procedure has been drafted, it should be reviewed by subject matter experts from the units to verify that the information is current and correct technically. Unit reviewers need not review for format. Comments from this review should be resolved and incorporated as appropriate. After incorporating comments, update the revision number in the footers.

TECHNICAL VERIFICATION REVIEW

The next review is a technical verification review that is performed by the engineering group for the unit. This review is to assure that the information is current and correct, and serves as a check of the initial unit review. Reviewers should focus on technical points, such as operating limits, event sequences, etc. Comments from this review should be resolved and incorporated as appropriate. After incorporating comments, update the revision number in the footers.

FORMAT REVIEW

- Format review is designed to ensure consistency in formatting and final production quality. The designated format reviewer will perform this review after all the technical issues have been resolved and incorporated. Comments from this review that may affect the content of the procedures will be resolved prior to incorporating them. Non-technical formatting issues will be incorporated into the document. The revision number will be made Revision 0, and the manual will be issued for approval.

Gathering Data to Prepare for Writing Procedures

Several pieces of information help in writing the emergency procedures. Current emergency procedures should be checked to extract as much appropriate and accurate information as possible. Task data collected, as part of the job task analysis should be reviewed. Descriptive information, and applicable engineering documentation, such as P&IDs should be assembled before the writing process begins. Once the information is collected the data from each information source must be compared, any conflicts resolved, and any missing pieces filled in.

Developing Procedure Lists

Before writing emergency procedures, you should develop a list of all the procedures that will be written for the unit, and organize them along the standard emergency procedure categories identified earlier. The senior operator/procedure developer should work with the task analyst to create a cross reference matrix for procedures, task details, and job aids, as described in Section 4.

Developing Front Matter for the Emergency Procedures Volume

A template is provided for developing the emergency procedures front matter. For the most part, the information in the front matter will not change from unit to unit. If any additional section of procedures will be added, a numbering scheme and an explanation of the contents of that section should be added to the Front Matter.

Resolving Technical Content Questions

If any conflicts arise in comparing the data from various information sources for the emergency procedures, resolve using technical experts. If the conflict is about equipment, analyze up-to-date equipment lists and drawings, or walk down the unit to figure out which equipment information source is accurate. Use a copy of the task analysis or the existing procedure to document the results of any findings, but use the same document to record all the findings. Use this marked up document as the basis for the writing a new procedure.

A list of items to check during this comparison is provided below. It is not a complete list; use your technical knowledge or seek a subject matter expert to assess any other potential problems and determine the technical accuracy and completeness of the information.

Are all the steps (sub-steps) included?
Are the steps in the right order?
Is information in each step or set of steps provided to the same level of detail?
Are appropriate set points and targets included in the information?
Is appropriate information about personnel and equipment hazards included?
Is it clear who performs the steps (Head Operator, CBO, Outside Operator)?

Organizing and Drafting Procedures

Once all the information has been evaluated, it should be organized into a logical sequence for writing the procedure. Mark up the task analysis or current procedure to identify each step and sub-step in the sequence.

REVISION RECORD

Date	MOC#	Comments
1-18-2011		Added Revision Record. Convert from html to pdf.

Manuals and Procedures
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Appendix J

Design and Format for Emergency Procedures

Design and format is a human factor standard. In an emergency, people need to be able to recognize information as quickly as possible. Design and format makes a document look specific to its function. That way it cannot be confused with another document. In an emergency stress factors play a part in how people respond. Readily recognizable documents help to reduce this.

This appendix shows the design, format and layout for emergency procedures and explains how they should look. There are several different design elements that are not used in Normal Procedures so read this appendix thoroughly before you begin writing the emergency procedures.

This Appendix includes the following:

- Color Coding
- Renumbering And Exit Actions
- Title Block (on first page)
- First Page design and layout
- Three Column Format
- Revision Record

Color Coding Standard

The use of color is only required on the first page and is supported by human factors standards if it is used consistently and the meaning is defined. Too many colors are distracting as the eye searches the document to explore the colors (much like a painting or drawing or cartoon). This distracts the user from the content. A good rule of thumb is no more than three different colors on one page.

Color coding is limited to the following:

FIRST PAGE COLOR CODE

On the first page of an Emergency Procedure (or Summary Section) use the following colors:

Immediate Actions - Red

Stabilizing Actions - Green

SECOND PAGE COLOR CODE (AND SUPPORTING PAGES)

On the second and supporting pages (for Immediate and Stabilizing Actions) use black; however, the following options are acceptable standards:

Control Board Operator - Blue

Area or Field Operator - Green

Head Operator / Other personnel - Black

Exit Actions are usually listed on the last page (maybe more, depending on how complicated the process requirements) use black.

The acceptable standard for **Caution, Note, and Warning** is black. These are set apart from the detail steps in boxes containing text. For emphasis, red bold may be used for the words

'**Warning**' and '**Caution**'. A good rule of thumb is to refrain from using this when there is already blue, green and black on the page.

Renumbering and Exit Actions

Procedure Templates have a renumbering macro that applies numbers to detail steps and all sub steps. In Emergency Procedures the Exit Actions start at number 1. For example, if the immediate and stabilizing actions are steps 1 through 10 and the exit actions are numbered 1, 2, 3, and 4; after using the re-numbering macro the Exit Actions will read 11, 12, 13, and 14. This is not accurate and must be corrected to 1. If you use the renumbering macro on emergency procedures the exit actions must be reset starting at # 1.

Title Block

A title block includes the header, approval bar, and authority. Figure 1 shows the title block of an emergency procedure. It contains Business Unit and Plant names; the Procedure Number, Procedure Name, and Approval Bar information and the OSHA NEP Protocol for established Authority to use the procedure.

Emergency Procedure	
ISOMAX ABU	Response to Fire
TKN/ISO	ISO EP 410

Approval: F. L. Baltich	Date: 6/18/99

Authority: The Head Operator on shift has the authority to initiate this emergency procedure.

Figure 1- Title Block (or Header)

First Page - Two Columns- Summary Steps

The first page uses two columns to list immediate and stabilizing actions. These are the detail steps from the Detailed Immediate Actions and Detailed Stabilizing Actions that were developed first. See Appendix I – Writing Emergency Procedures for details.

EMERGENCY PROCEDURE	Richmond Refinery
ABU	Procedure Title
Plant	INSERT document name here

Original Approval:	Date:

Authority: The Head Operator on shift has the authority to initiate this emergency procedure.

Immediate Actions	Stabilizing Actions
Immediate Actions are in RED.	Stabilizing Actions are in GREEN.
Immediate Actions are in RED.	Stabilizing Actions are in GREEN.
Immediate Actions are in RED.	Stabilizing Actions are in GREEN.
Immediate Actions are in RED.	Stabilizing Actions are in GREEN.
Immediate Actions are in RED.	Stabilizing Actions are in GREEN.

****End of Action Checklist****

****Detailed Immediate Actions Start Next Page****

Figure 2 – EMERGENCY PROCEDURE – First Page

DETAILED IMMEDIATE ACTIONS

Detailed immediate actions are written in red. The action **verb** is bolded.

DETAILED STABILIZING ACTIONS

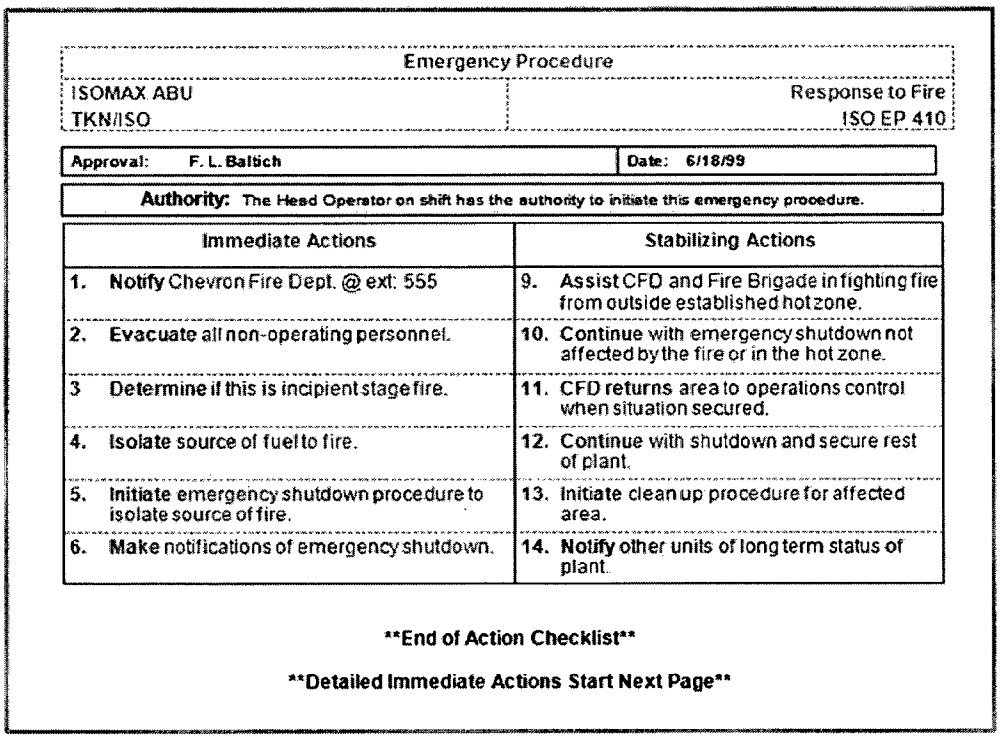
Detailed stabilizing actions are written in green. The action **verb** is bolded.

DETAILED EXIT ACTIONS

Exit actions are written in black. The action verb is not bolded as there is no urgency implied once the situation is stabilized. **NOTE**: Exit actions are not listed on the first page of Emergency Procedures.

Figure 3 shows an example of the first page for an emergency procedure written to respond to a fire. *This is meant as an example only. Do not use this example in the field as it was created to use as an example to show formatting, layout, and text.* ***The content is not intended to use.***

****Figure 3 – Content is not intended for use. ****



Emergency Procedure

ISOMAX ABU TKN/ISO	Response to Fire ISO EP 410

Approval: F. L. Baltich	Date: 6/18/99

Authority: The Head Operator on shift has the authority to initiate this emergency procedure.

Immediate Actions	Stabilizing Actions
1. **Notify** Chevron Fire Dept. @ ext: 555	9. Assist CFD and Fire Brigade in fighting fire from outside established hot zone.
2. **Evacuate** all non-operating personnel.	10. Continue with emergency shutdown not affected by the fire or in the hot zone.
3 Determine if this is incipient stage fire.	11. CFD returns area to operations control when situation secured.
4. Isolate source of fuel to fire.	12. Continue with shutdown and secure rest of plant.
5. Initiate emergency shutdown procedure to isolate source of fire.	13. Initiate clean up procedure for affected area.
6. Make notifications of emergency shutdown.	14. **Notify** other units of long term status of plant.

****End of Action Checklist****

****Detailed Immediate Actions Start Next Page****

Figure 3– Example of Emergency Procedure First Page.

****Figure 3 – Content is not intended for use. ****

Figure 3 – shows the first page of an Emergency Procedure. Notice it does not contain the usual 'front matter' information such as Safety & Environmental Precautions, References, or Prerequisites found in Normal Procedures.

Emergency procedures are used in response to an emergency and information is expected to be "memory reticent" or already committed to memory by individuals qualified to operate the plant.

Three Column Format

The three column format is used to write the detail action steps. Except for the first page, this format is used to write the emergency procedure. All detail steps, sub-steps, and sub-sub-steps are written in this format.

The left side shows the person responsible for performing the step. The middle shows the actions steps. The right shows the detail sign-off. Figures 4, 5, and 6 show more details for the following:

- Detail Immediate Actions
- Detail Stabilizing Actions
- Exit Actions

DETAIL IMMEDIATE ACTIONS

****Figure 4 – Content is not intended for use. ****

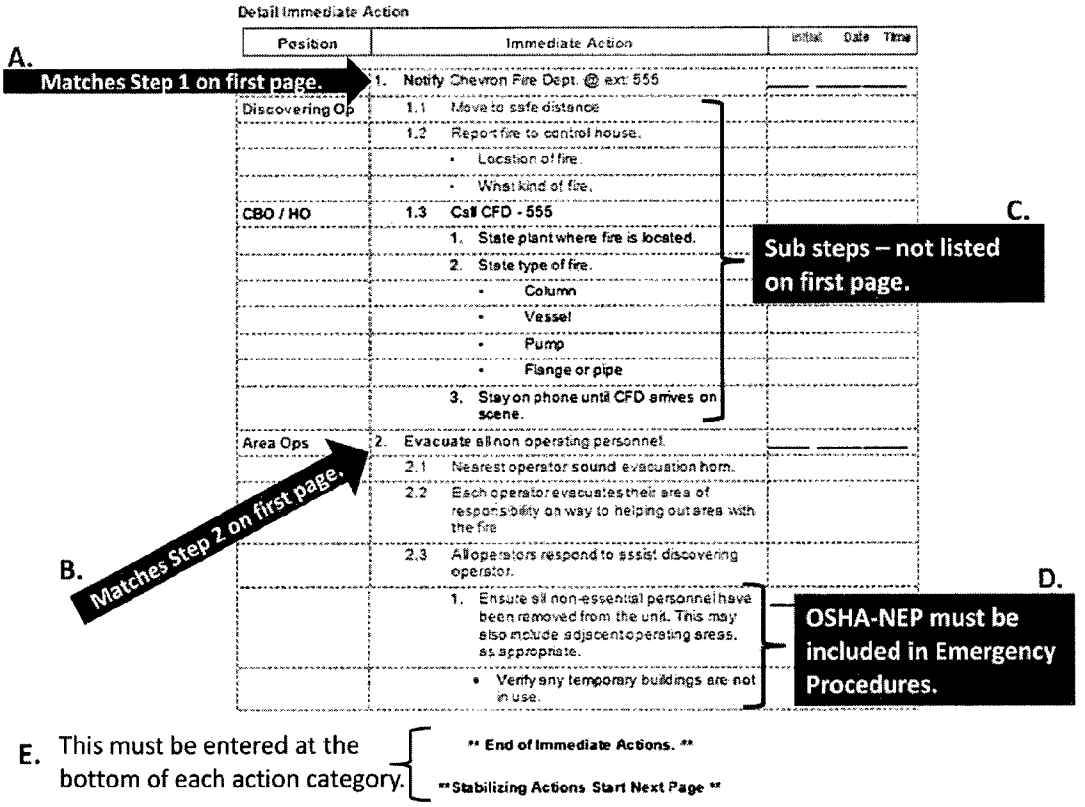


Figure 4 – Detail Immediate Actions - & Sub Steps

****Figure 4 – Content is not intended for use. ****

- Items A and B on Figure 4 show the Detail steps that are used on the first page of the Emergency Procedure. These steps must match exactly. This is listed on the left side, under Immediate Actions, formatted in red text.
- Item C of Figure 4 shows the sub-steps of Step 1. Sub steps are not included on the first page of an Emergency Procedure.

- Item D of Figure 4 shows the Standard OSHA-NEP for ensuring all non-essential personnel are removed from the operating area during an emergency.
    - OSHAs' National Emphasis Program (NEP) makes recommendations to industry suggesting standards that should be used. One of these recommendations is the following verbiage:

      Ensure all non-essential personnel have been removed from the unit. This may also include adjacent operating areas, as appropriate.
        - Verify any temporary buildings are not in use.
        - Ensure work permits being issued during this procedure are restricted to essential activities only.
        - Communicate any required work restrictions to adjacent operation units.

      This verbiage is approved and must be used in all Emergency Procedures. The intent of this verbiage ensures that only operating personnel assigned to the plant remain in an emergency.
- Item E of Figure 4 shows the closing statements for Immediate Actions. The intent is to tell the user they are done with Immediate Actions. Then let them know what to expect - Stabilizing Actions is next. Knowing what to expect decreases stress in an emergency situation.

DETAIL STABILIZING ACTIONS

**Figure 5 – Content is not intended for use. **

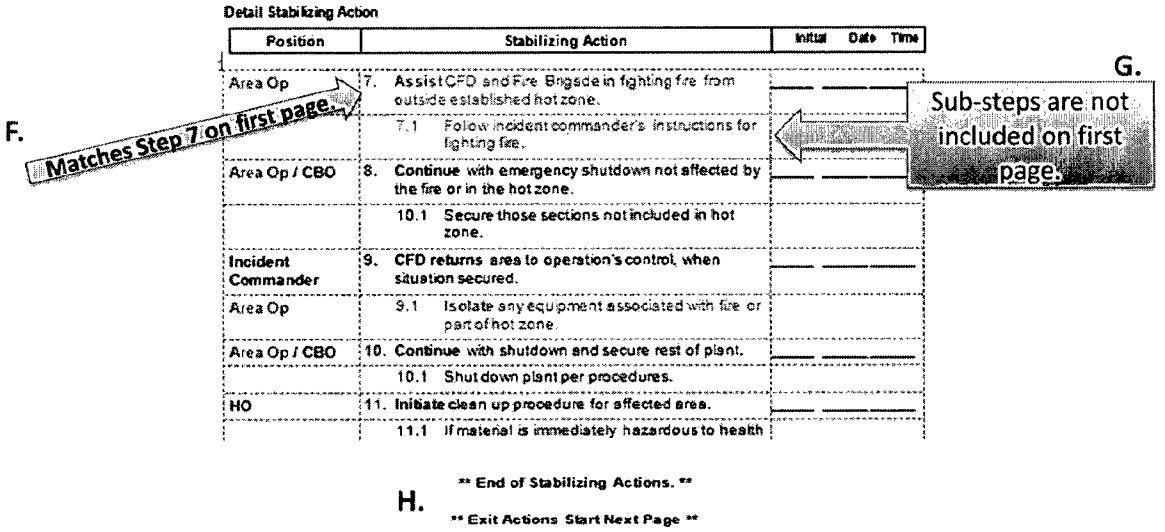


Figure 5- Stabilizing Actions

**Figure 5 – Content is not intended for use. **

- Item F of Figure 5 shows the Detail step that is used on the first page of the Emergency Procedure. These steps must match exactly. This is listed on the right side, under Stabilizing Actions, formatted in green text.
- Item G of Figure 5 shows the sub-steps of Step 1. Sub steps are not included on the first page of an Emergency Procedure.
- Item H of Figure 5 shows the closing statements for Stabilizing Actions. The intent is to tell the user they are done with Stabilizing Actions. Then let them know what to expect - Exit Actions is next. Knowing what to expect decreases stress in an emergency situation.

DETAIL EXIT ACTIONS

I.

First column on the left is condition.

Detailed Exit Actions

Condition	Exit Action	Initial	Date	Time
Orders to shut down unit	1. Proceed to normal shutdown procedures:			
	• ISO-NP-3002 TKN/ISO Shutdown			
	• ISO-NP-3003 IsoSplitter Shutdown			
	• ISO-NP-3004 GRU Shutdown			
Orders to start up unit	2. Proceed to normal startup procedures:			
	• ISO-NP-2100 TKN Startup			
	• ISO-NP-2200 ISO Startup			
	• ISO-NP-2300 IsoSplitter Startup			
	• ISO-NP-2400 GRU Startup			

Field Verification on next page

Figure 6 – Exit Actions

- Item I of Figure 6 shows the left column. For EXIT Actions this column is labeled **Condition** instead of Position. In Emergency Procedures the exit action segues to normal operations. The emergency is over, the plant is stabilized and now it's time to establish normal operations.
- Looking at the red circles, notice the Exit Action numbers are re-set starting at # 1. This is why the renumbering macro presents challenges because it does not reset to 1 on Exit Actions in Emergency Procedures.
  - If you use the renumbering macro it will assign a number to the next detail step in order. If this procedure has 14 steps then step 1 above will show up as 15. Since there are only two steps listed on this page it wouldn't be that much work to simply renumber them back to step 1 and 2 after running the renumbering macro.
  - But what if there are 7 or 8 steps on this page? It's up to the procedure writer.
- Before the plant can be returned to normal operations the conditions must be identified so operators know what to do next.
  - If the orders are to shut down then the normal shut down procedures are used.
  - If the orders are to start up then the normal start up procedures are used.
- **Field Verification on next page** is listed at the bottom of every procedure. The procedure is not complete until it is *field verified as accurate and reflecting current practice*. This is an OSHA standard. The Richmond Refinery uses the Field Verification to provide users an easy method to meet the standard.
  - After the HO Field Verification is complete enter the review in the EMMS database. This will reset the review cycle another three years out. *For example*: This procedure was due to be reviewed in 2012. Emergency Procedures are reviewed on a three year cycle. Three years from today (2011) is 2014. This procedure is due for its next validation in 2014 or upon its next use, whichever comes first.
  - If a step change is needed then use a management of change process.

Revision Record

The revision record is the last page of each procedure listed after the Field Verification. The intent is to document changes that have been made to the document. It's a record or history of the document. Figure 7 shows a revision record.

A management of change process is used to make step changes to EMERGENCY Procedures.

Revision Record

Date	Step #	MOC#	Comments
12/05/97	All	N857-96-023	Originally Issued.
6/1999	8&14	REF-99-001	Replaced Supervisor with Area Supervisor
5/24/04	All	13166	Human Factors review – minor formatting changes throughout.
4-18-07		13166	Added Head Operator Field Verification /lg
10-18-07		MOOC 35	Entered updates to reflect organizational changes.
3-10-08	1st Page	NEP OSHA Protocol	Emergency procedures shall specify who has the authority to initiate the procedure. This is a result of the NEP OSHA audit protocol and is required for the US refineries subject to these reviews.
6-17-08	2.3	NEP OSHA Protocol	Approved NEP OSHA statement for evacuation.
12-1-08	All	NEP OSHA Protocol	Added additional items to remove non-essential personnel from operating area in section 1.1, Updated warning boxes to reflect human factors. Changed fire hose size at 4.2 from 2.5" to 1.5". Added comment stating plant is released to Ops by incident command. jkda
12-7-08	All	APR Review	SME completed 2008 annual review.
1-14-2011	All	13166	Completed field verification. No changes needed. Procedure reflects current practice.

Figure 7 – Revision Record

REVISION RECORD

Date	MOC#	Comments
1-18-2011		Added Revision Record. Converted from html to pdf.

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Appendix K

File Names and Procedure Numbers

Procedure numbering and file names follow a methodology to ensure each document has a unique identifier that is recognized by a document management system (DMS). The following explains the methods used to create file names, categorize, and organize documents used in the EOM.

File Names and Conventions

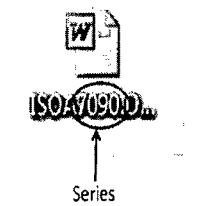
Conventions are identifiers assigned to a specific group of letters or numbers that assign specific meaning. For example, the #4 Crude Unit at Distillation and Reforming is identified as 4CU. This identifier is used throughout the EOM for the #4 Crude Unit. Convention methodology is used to create file names.

Document management is based on the document file name. This is why file naming is so important. One of the first rules of file names is *not to change file names once* the document is added to the document management system (DMS). File names are unique to each document and recognized by the DMS. The DMS uses 'convention identifiers' or 'tags' to organize the documents into related groupings such as plant, category, and procedure series. Figures 1 thru 1c shows how the file name logic is applied.

Figure 1– MS Word document using file name

Figure 1 shows a procedure that is named following EOM methodology. This document has a unique name recognized by the DMS. The document is an Alarm Test Procedure belonging to ISOMAX.

Figure 1a thru 1c shows how the logic is applied.

 Figure 1a – Plant	**Plant Name** The first three spaces of the file name represent the business unit plant. It is the first three letters of the plant name.
 Figure 1b – Procedure Category	**Procedure Category** The forth space is the first letter of the procedure category name i.e. Alarm, Normal, Routine, or Emergency.
 Figure 1c – Procedure Series	**Procedure Series (type)** The fifth through eighth spaces is the numbered series to which the procedure applies. For this example, 7000 Series is Alarm Test Procedures. The complete series is listed Volume II Procedure File Naming Logic of this document.

After the file name is assigned to the document it is also entered into the document header. This file name is how the document is located within the DMS. If it is changed then there will be two documents

with the same title but different file names within the DMS. This creates confusion for end users. Do not change file names.

Figure 2 – Template Header shows where the procedure title and file name is entered.

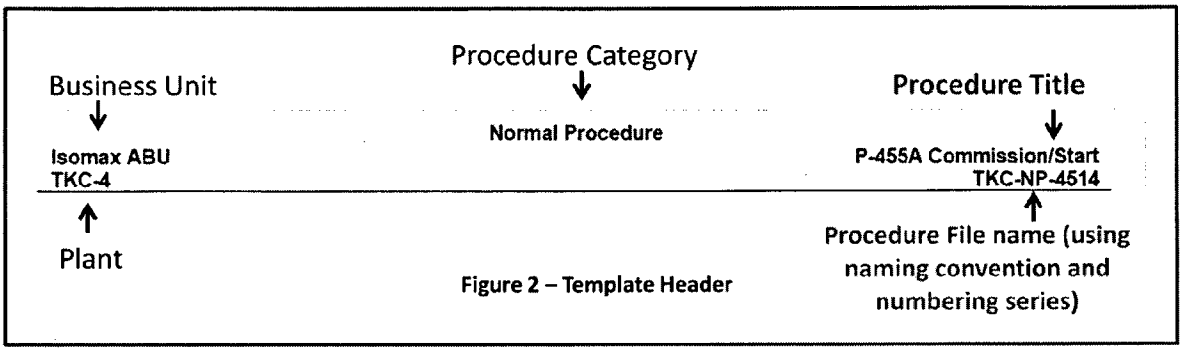


Figure 2 – Template Header

Figure 2a – Shows the header for Alarm Test Procedure ISOA7090.doc

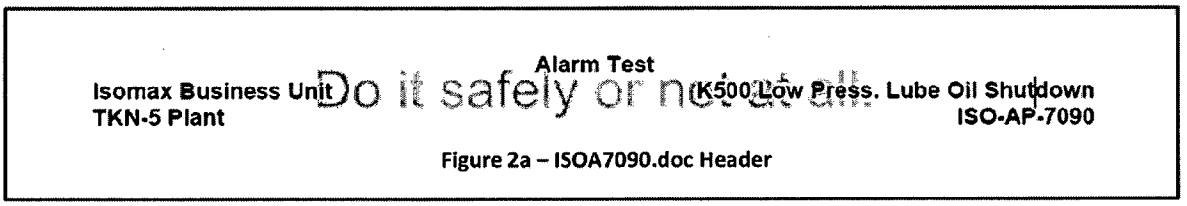


Figure 2a – ISOA7090.doc Header

File Name Identifiers

To create a file name the identifiers for each part of the EOM/EMM must be known. These are consistent throughout the EOM/EMM for the volume, section, chapter, or procedure. This is applied in a logical method to ensure documents are labeled and tagged in the DMS to maintain the document library. The EOM is organized into four volumes. These 'parts of the EOM' use the following identifiers or tags:

EOM Names (parts)	Identifiers (tags)
• Volume I – Process & Equipment Description	• PE
• Volume II – Normal Procedures	• N
• Volume III – Emergency Procedures	• E
• Volume IV - Training	• J, Q, LP, BIC, TC, Sits

Each part has a standard file naming identifier and follows a specific logic to create file names.

Volume 1 – Identifiers (or tags)

Table 1 – Shows the file naming tags used to name documents in for EOM/EMM Volume I – Process & Equipment Description. Each plant in the Refinery has a tag that identifies it. The tag is unique and assigned only to those documents belonging to that plant.

Table 1 –Naming logic for EOM/ EMM Volume I

UNIT	This indicates the unit to which the procedure applies. For example, the #4 Crude Unit is designated with **4CU**.	
Volume Name Process & Equipment	Volume I is Process and Equipment. The tag is **PE**.	
Chapter # 01 - 07	There are seven chapters in Volume I-Process and Equipment Description of the EOM. These are:	
	Chapter 1	Introduction - Generic Chapter used for all plants. - (**01**)
	Chapter 2	Process Information – (**02**)
	Chapter 3	Safety Information – (**03**)
	Chapter 4	Environmental Information – (**04**)
	Chapter 5	Normal Operations- (**05**)
	Chapter 6	Equipment – (**06**)
	Chapter 7	Utilities - (**07**)

Volume I - File Naming Logic

The logic is applied to the tags in specific order.

1. Plant Name (4 Crude Unit)
2. PE (for Process & Equipment Description)
3. Chapter Number (03 means Chapter 3 – Safety)

Figure 3 shows how the above logic is applied to create a file name for #4 Crude Unit / Process and Equipment Description/ Chapter 3.

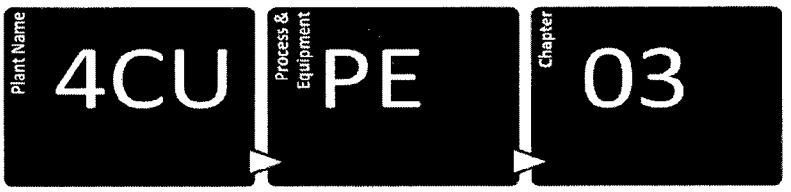
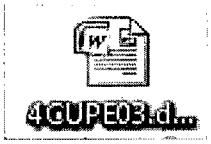


Figure 3 – Example for Process & Equipment (Volume 1)



This is the document on the desktop with the file name in Figure 3 assigned to it.

This logic is used for all documents belonging to Volume 1 – Process & Equipment Description.

Volume II –File Name Identifiers & Procedure Categories

Procedures are divided into four categories (or types). These category 'parts' organize the procedures in a logical order and enable the end users to readily identify the procedure. The category has different types of procedures associated within the category. Figure 4 shows three of the four procedure categories grouped in Volume II. The fourth category, Emergency, is grouped in Volume III.

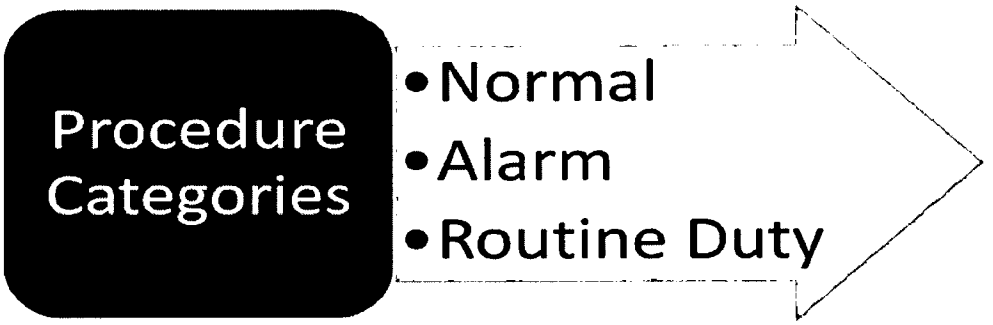


Figure 4 – Procedure Categories

Procedures assigned to Volume II have a numbered series that belongs to the type. Table 2 shows the type of procedure and the numbered series belonging to it. This allows maximum flexibility while managing procedures within the category. There are one thousand possible identifiers that can be used within any series. For example 2001, 2005, 2009, 2030, 2115, 2481, 2745, etc. Each one of these numbers is a unique identifier for that type of procedure. Whenever you see a procedure using '2000' you know it belongs to a start up procedure; if the procedure file name uses the '3000' series you know it's a shut down procedure; if it uses an '8000' series, then you know it's a routine duty procedure, and so on.

TABLE 2 – SHOWS THE TYPES OF PROCEDURE & NUMBERED SERIES

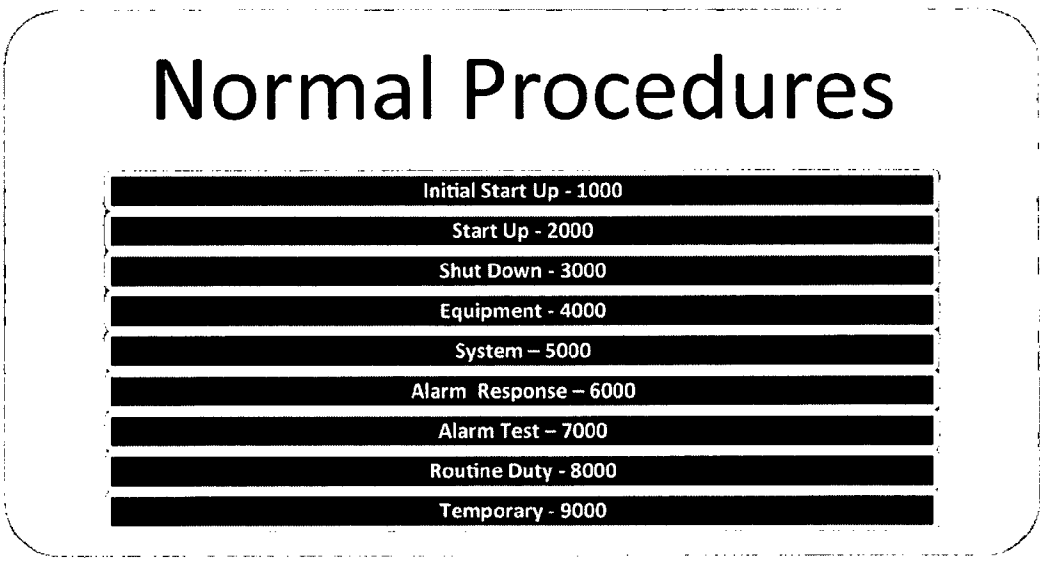


Table 3 shows the content of Volume II procedures and lists the series number, type and description for each in the normal procedure category.

TABLE 3 – PROCEDURE SERIES, TYPE AND DESCRIPTION

Series	Name	
NORMAL PROCEDURES (UNIT-N-XXXX):		
1000	Initial Start up	Critical alarms to be tested prior to startup must be listed in the prerequisites of the initial startup procedure. These alarms must be tested before initial startup.
2000	Start up	Contains the procedures that would be used to start up the unit. Critical alarms to be tested prior to startup must be listed in the prerequisites of the startup procedure. These alarms must be tested before startup.
3000	Shut down	Contains the procedures that would be used to shut down the unit.
4000	Equipment Related	Contains the procedures for starting up or shutting down pieces of equipment, and equipment procedures for special purposes. These should be organized into groups according to the component or equipment to which they apply. Typical groups include:
• 4100	Reactor related procedures	
• 4200	Column related procedures	
• 4300	Vessel or drum related procedures	
• 4400	Furnace related procedures	
• 4500	Pump and driver related procedures	
• 4600	Exchanger and cooler related procedures	
• 4700	Miscellaneous equipment related procedures	
• 4800	Routing and Flushing procedures	
• 4900	Administrative procedures	
5000	This section contains the procedures for system related operations. These should be organized into groups according to the affected system to which they apply.	
ALARM PROCEDURES (UNIT-A-XXXX):		
6000	Alarm Response	This section contains the procedures for operator response to an alarm on the unit.
7000	Alarm Test	This section contains the procedures to test the unit alarms. Ensure that alarm test procedures exist for all critical alarms. These must be tested prior to startups.
ROUTINE DUTIES (UNIT-R-XXXX):		
8000	Routine Duty	This section contains the procedures associated with the regularly scheduled routine duties performed as part of the normal conduct of operations for the unit.
TEMPORARY PROCEDURES (UNIT-N-XXXX):		
9000	Temporary	This section contains any procedures written for temporary use only. The expiration date for temporary procedures must be included. Once the expiration date is reached it is expired and no longer authorized to use. [1]Temporary procedures must be validated and approved before each use once the expiration date has expired. "NOT AUTHORIZED FOR USE" is inserted into the body of the procedure and posted for viewing and informational purposes.

Checklists (UNIT-C-XXXX):

Checklists are developed to use when completing a systematic sequence of tasks. There are three intended uses of checklists:

- Those developed and based on a detail procedure (sometimes referred to as Procedure Checklists)
- Those re-categorized from job aids or other material. See Appendix S. Re-Categorized Procedures.
- Those developed originally as checklists (not based on previous procedural material).

****A checklist is not a procedure although sometimes they are referred to as procedures. ****

[1] **Per MTBR 10-30-08**

FILE NAMING LOGIC FOR NORMAL PROCEDURES

Normal procedures are identified by their type or series. All procedures using 1000, 2000, 3000, 4000 and 5000 series are normal procedures.

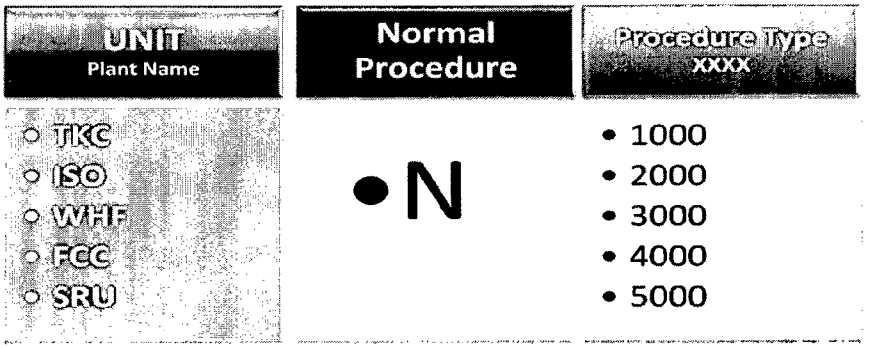


Figure 5 – Example for Normal Procedure (Volume II)

EXAMPLES of file names:

UNIT	N	XXXX	Descriptions
TKC	N	2026	This procedure is a start up procedure for the TKC Unit in North ISOMAX.
ISO	N	3074	This procedure is a shut down procedure for the ISOMAX Unit.
WHF	N	4535	This procedure is an equipment related procedure for the Long Wharf at Blending and Shipping.
FCC	N	5063	This procedure is a system procedure for the FCC Plant at Cracking.
SRU	N	4630	This is an Exchanger/cooler related procedure at the SRU Plant in Cracking.

EXAPILOT PROCEDURES:

Exapilot June 2008	To readily identify procedures belonging to and created using Exploit software, an '**X**' is placed after the unit identifier. For example, the No. 4 Crude Unit Exapilot procedures are designated with 4CU**X.**

*****EMERGENCY, ALARM, ROUTINE DUTY, AND TEMPORARY PROCEDURES FOLLOW*****

VOLUME III - FILE NAMING LOGIC FOR EMERGENCY PROCEDURES

The emergency procedures are divided into four types that contain logical groupings of related information. Each procedure is uniquely designated. It uses the same logic explained in for Normal Procedures except the identifiers are different for the procedure type series. Figure 5 shows the basic file name logic.

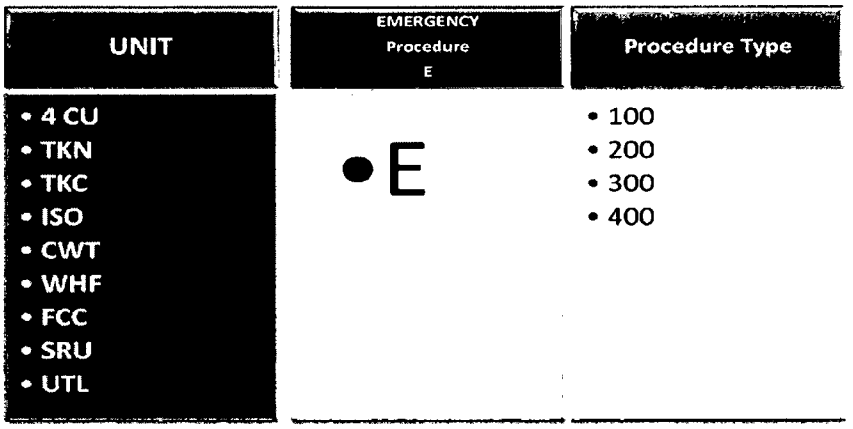


Figure 5 – Example for EMERGENCY Procedure (Volume III)

Each procedure's sequence consists of three parts, UNIT-E-XXX.

IMPORTANT NOTE: Emergency procedures use three digits for the type identifier. Instead of 2000 series for normal procedures, emergency procedures use 200 series. See the examples below:

EXAMPLES of file names:

UNIT	N	XXX	Descriptions
TKC	E	102	This is an EMERGENCY shut down procedure for the TKC Unit.
ISO	E	307	This is an EMERGENCY procedure for the loss of a critical pump, utility, steam or other critical system vital to the safe operation of the unit. It belongs to IOSMAX.
WHF	E	413	This is an EMERGENCY response procedure to an unusual occurrence, such as an earthquake or loss of electricity. It's for the Long Wharf.
FCC	E	206	This is an EMERGENCY procedure for loss of utilities, like steam, yard air, and electricity. It for the FCC Plant at Cracking.
SRU	E	463	This is an EMERGENCY response procedure to an unusual occurrence, such as an earthquake or fire. It's for the SRU Plant located in Cracking.

ALARM PROCEDURES FILE NAME LOGIC

The logic for naming alarm procedures is the same as normal procedures but a few of the identifiers are changed. Figure 6 shows how the logic is applied to alarm procedures. The example below explains the series and the difference between response and test.

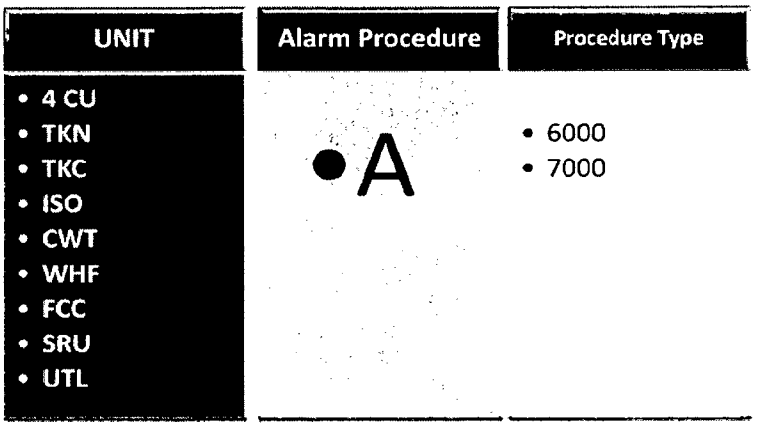


Figure 6– Example for Alarm Procedure (Volume II)

Example:

ALARM PROCEDURES (UNIT-A-XXXX):		
6000	Alarm Response	This section contains the procedures for operator response to an alarm on the unit.
7000	Alarm Test	This section contains the procedures to test the unit alarms. Ensure that alarm test procedures exist for all critical alarms. These must be tested prior to startups.

ROUTINE DUTY PROCEDURES FILE NAME LOGIC

The logic for naming routine duty procedures is the same as normal procedures but a few of the identifiers are changed. Figure 7 shows how the logic is applied to routine duty procedures. The example below explains the series.

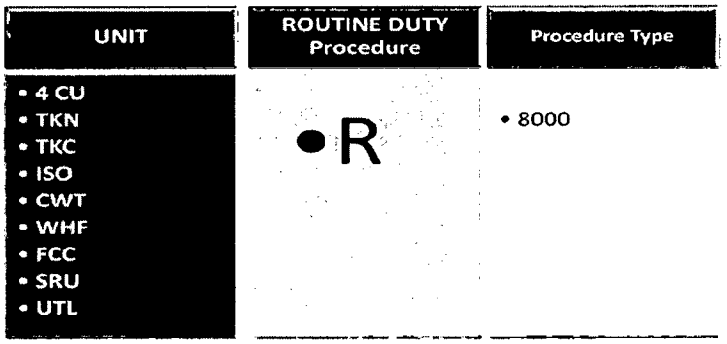


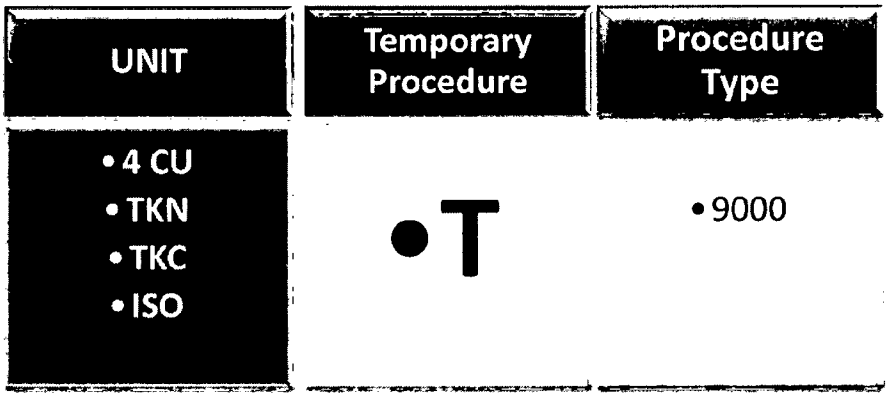
Figure 7– Example for Routine Duty Procedure (Volume II)

EXAMPLE:

ROUTINE DUTIES (UNIT-R-XXXX):		
8000	Routine Duty	This section contains the procedures associated with the regularly scheduled routine duties performed as part of the normal conduct of operations for the unit.

TEMPORARY PROCEDURE FILE NAME LOGIC

The logic for naming temporary procedures is the same as normal procedures but a few of the identifiers are changed. Temporary procedures have expiration dates and must be moved within the DMS after the expiration date is reached. Figure 8 shows how the logic is applied to temporary procedures. There is a special type of temporary procedure called IMPACT which is discussed in this section. These require specific management within the DMS process.



TEMPORARY PROCEDURES (UNIT-N-XXXX): *No relation to IMPACT Event.*		
9000	Temporary ***NOTE**: For temporary procedures resulting from an IMPACT Event go to IMPACT EVENT File Name Logic.*	This section contains any procedures written for temporary use only. The expiration date for temporary procedures must be included. Once the expiration date is reached it is expired and no longer authorized to use. [2]Temporary procedures must be validated and approved before each use once the expiration date has expired. "NOT AUTHORIZED FOR USE" is inserted into the body of the procedure and posted for viewing and informational purposes.

Temporary Procedure Format – (non-IMPACT Event)

Temporary Procedure	
Distillation & Reforming ABU 4 Crude Unit	Place Both P-1189's in 8 S/C Service 4CU-TP-9030

Original Approval: Need Approval Before Use	Date: 7/16/03	Expiration Date: 10/16/03

Must be reactivated via the MOC process prior to use

Norm Procedure Web Page:

9000 Temporary.

td

No Active Temporary Procedures - For Expired Procedures go to IMPACT/TEMP/ARCHIVED.

[2] Per MTBR 10-30-08

IMPACT Event - File Name Logic

IMPACT Event procedures are any temporary procedure used as part of a pit stop, turnaround, planned shutdown, or start up in which the Impact Process is used to create temporary procedures pertaining to specific conditions within the event. The following types of procedures are used as Impact Event Procedures:

- Start Up (2000 Series)
- Shut Down (3000 Series)
- Equipment (4000 Series)
- Temporary (9000 Series)

These procedures have an expiration date that is determined by the Impact Group schedule. Once the Impact Event is complete (and the documents expire) these procedures become reference documents only, and must be reactivated via MOC before use.

EOM Filename Identifiers and Documentation for Impact Event Procedures:

File name identifiers for IMPACT Event Procedures:

- IMPACT: **IM**
- Year: last two digits of the year in which the event takes place i.e., **10** for 20**10**.
- Plant: standard identifier used for the plant
- Series: 2000, 3000, 4000, or 9000

Naming logic:

Example: IM10ALK3001

Document Formatting for USE: Impact Event Procedures will include the following heading shown in Figure 9. The example following Figure 9 shows the header after it is completed.

Year SHUTDOWN IMPACT EVENT

Area Business Unit
Plant **IM-YR-PLANT-DOC#**

Original Approval:	Date:	Expiration Date:

Figure 9– Example for IMPACT Procedure (Volume II)

EXAMPLE of completed Impact Procedure header:

2010 SHUTDOWN IMPACT EVENT

Area Business Unit **Hydrocarbon Free Deisobutanize Section**
Plant **IM10ALK3000**

Original Approval: Ron Moore	Date: 10/21/2010	Expiration Date: 12/21/2010

Document Formatting after EXPIRATION:

Expired impact Event Procedures include the following heading and Figure 10 shows the 'Expired' Water Mark that is added to all expired IMACT procedures.

2010 START UP PAST IMPACT EVENT

Cracking Area Business Unit Alky Unit	Hydrocarbon Free Deisobutanize Section IM10ALK3000

Approval: Need Approval Before Use	Date:	Expiration Date:

Must be reactivated Via the MOC process prior to use

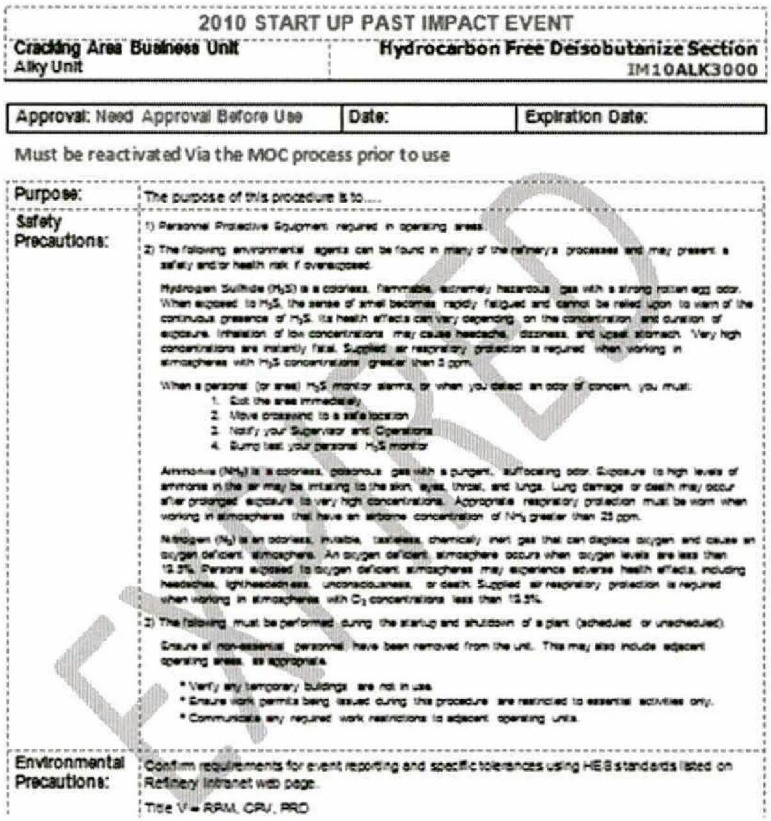
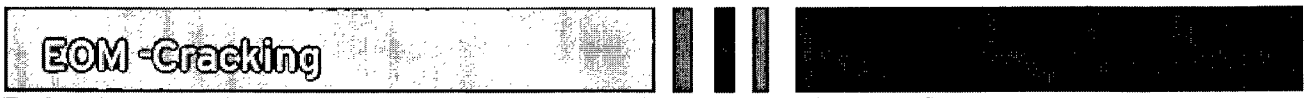


Figure 10 – Example of Expired IMPACT Procedure (Volume II)

Once a procedure has expired it is moved to The "Past Impact and Expired Temporary Procedures" page located between Vol. 3 and Vol. 4 on the EOM grid page under Impact/Temp/Archived for each plant on the business unit web page.



The items beneath the blue header in the following table are managed by the Manuals & Procedures Group.
All other items are managed by the content owners listed on the associated web pages.

Plant Name	Vol 1		Vol 2			Impact/Temp/Archived	Vol 3	Vol 4	Other		
	Process Descrip	COD Table	Alarms	Normal Operations	Routine Duties	Obtain approval before use.	Emergency Operations	Training/ Job Aids	Lab'SOPs	P&IDs	Best Practice
Alky	X	X	X	X	X	X	X	X	X	X	X

The documents listed on this page serve as historical reference documents only. Figure 11 shows an example of the Past Impact and Expired Temporary Procedures web page.

ALKY Plant

Past Impact and Expired Temporary Procedures- (Volume II)

Procedures must be reactivated via the MOC process prior to use.

Once the Impact event is complete and documents expire these procedures become reference documents only, procedures must be reactivated via the MOC process prior to use.

Past Impact Shutdown Events

Temporary 2010 Shut Down Procedures	
9140	Hydrocarbon Free Deisobutanizer Section

Expired Temporary Procedures

9030	Hydro Blast V-1481 Suction Line
9035	Alky Posture For FCC E-192A/B work
9036	Return From Alky Posture For E-192A/B

Figure 11– Example of "Past Impact and Expired Temporary Procedures – (Volume II)

When a document is moved to the Past Impact and Expired Temporary Procedures page it includes the "Expired" watermark, a red highlighted **Expired** heading on the document, and the following verbiage: "**Must be reactivated via the MOC process before use.**" See example shown in Figure 10.

To "re-activate" a procedure for use:

- Create a Copy- Out Request for the original document
- Include the open MOC number
- Create a Check – In request for a NEW document with NEW document filename (IM or 9000)

Once re-activated the new procedure is removed from the "Past Impact and Expired Temporary Procedures" page and posted to the Normal Operations page for use until the expiration date has passed or its intended use is permanent. The MOC covers the approval and intended use of the procedure.

FILE NAMING LOGIC FOR TRAINING (VOLUME IV)

Volume IV, Training, follows the same methodology but identifiers are different and follow a slightly different logic. Volume IV consists of the following:

- Two generic training chapters (TC 1, TC 2)
- One training chapter for each job in the unit (TC 3, 4, 5, 6, etc)
- Lesson Plans (LP1, 2, 3, etc.)
- Job aids (J)
- Instructor Qualifier Guides (Q)

Volume IV File name identifiers and logic

Job Aids (UNIT task j) / IQ Guides (UNIT task q)	
UNIT	This part of the procedure designator indicates the unit to which the procedure applies. For example, the No. 4 Crude Unit is designated with 4CU.
Training Chapters= TC	One training chapter for each job in the unit TC 3, 4, 5, 6, etc.
Lesson Plans = LP	LP1, 2, 3, etc.
JOB TASK # = four spaces.	Job Task numbers are assigned during the job task analysis. These identifiers are used to sort tasks that are performed and evaluated using a criticality index. Each ABU has a job task index that lists these numbers. The job task number is a four-digit identifier beginning with a number followed by a letter and two numbers. I.e. **9b01**. The trainer keeps the job task list.
Job Aid = J	The letter "j" is used, i.e. **9b01j.doc**
I Q Guide = Q	The letter "q" is used, i.e. **9b01q.doc**
Other Vol. IV documents	Use PQD Qualification Codes as the filename. These documents are:
BIC	Break In Check List
SIT	Situationals
SO/WT	Solo Oral and Written Tests
PO/WT	Panel Oral and Written Tests

It helps to review the naming identifiers in use for the EOM in your ABU. Follow the logic or contact the Manuals & Procedure Specialist (or Technical Writer for your area), for assistance.

File Naming for Refinery Wide Documents

The first three letters: **RIC** followed by standard format used by DMS for the EOM.

RIC	This part of the designator indicates Richmond
TD	This part of the designator indicates the **T**ype of procedure, i.e. Normal, Alarm, Routine Duty, Job Aid, etc., followed by the series, i.e. 2000, 3000, 4000, 5000, etc.
XXXX	This part of the designator is usually a number but other digits such as letters or accepted symbols may be used. The objective is to follow the logic and create a unique name for the document that is recognized by the DMS.

Folders in the DMS and on the Web
A separate folder for Refinery documents is set up in the DMS. Each ABU EOM webpage links to single source files in the Refinery document folder.

Managing multiple files for the same document
Word documents (.doc) that require Visio support are checked into the document management system along with the Visio drawing (.vsd). When checking out the document(s) request the word doc along with the supporting Visio drawing. The Visio drawing can be edited and Paste Special back into the Word doc.

If the resulting document takes too long to load when published to the web, then save the Visio drawing (.vsd) as a graphic file (.gif, .png, .wfm, other available format), and insert the graphic into the word document and save. Save the Visio drawing. Check the .doc and .vsd into document management system. Using a .gif file is universally acceptable for the web, loads faster and takes up less storage space

Use software technology that is available to reduce file size and create documents that are editable and accepted by the DMS.

REVISION RECORD

Date	MOC#	Comments
1-11-2011		Added Revision Record. Converted this appendix from .html page to .pdf.

Manuals and Procedures
EOM Guidebook
Appendix L

Job Aid Tools

Basically all job aids are developed and named using the same process as procedures. Job aids use revision records to record changes to the content. This helps users determine if they have the most current training job aid. Job aids can be in formats such as power point, pictures, flow charts, and video as well as word documents. Job aids take many forms. These are:

Text Based – using MS Word template with minimal photographs, graphics, or flow charts

All Other - Audio/Visual - such as video, photographs, graphics, charts, diagrams and basic line drawings in combination with text.

For video production contact the Refinery Communications Team for more information.

Text based Job Aids

Use the templates to create textual job aids. The template is used extensively through the creation of the EOM. It is very similar to the procedure templates and it helps to minimize initial set-up of textual job aids by providing header, footer, and margin standards.

LAYOUT

- Margins are .5 for top, bottom, and right, and .6 from left.
- The standard font is Arial with sizes assigned through each individual style in the template.
- Use Arial for text descriptions in the body of the job aid. If a second font is needed for emphasis, select from the style menu provided in the toolbar.

Note: The intent is to pick a font and back up fonts and use them consistently. Arial and Times New Roman, Verdana are commonly used as standards.

HEADER

Header information includes job title, duty letter and title, task name, and the job aids file name. See Appendix K-File Names and Procedure Numbers for details.

The file name uses is determined using the following logic:
Example: 4CU 1A02 J

NOTE ON FILE NAMES

Different media uses different logic for file names. The intent is for the finished product to be readily identifiable for its intended use and media of different content does not share the same file name. Each name should be unique.

See Figure 8- Job aid file names.

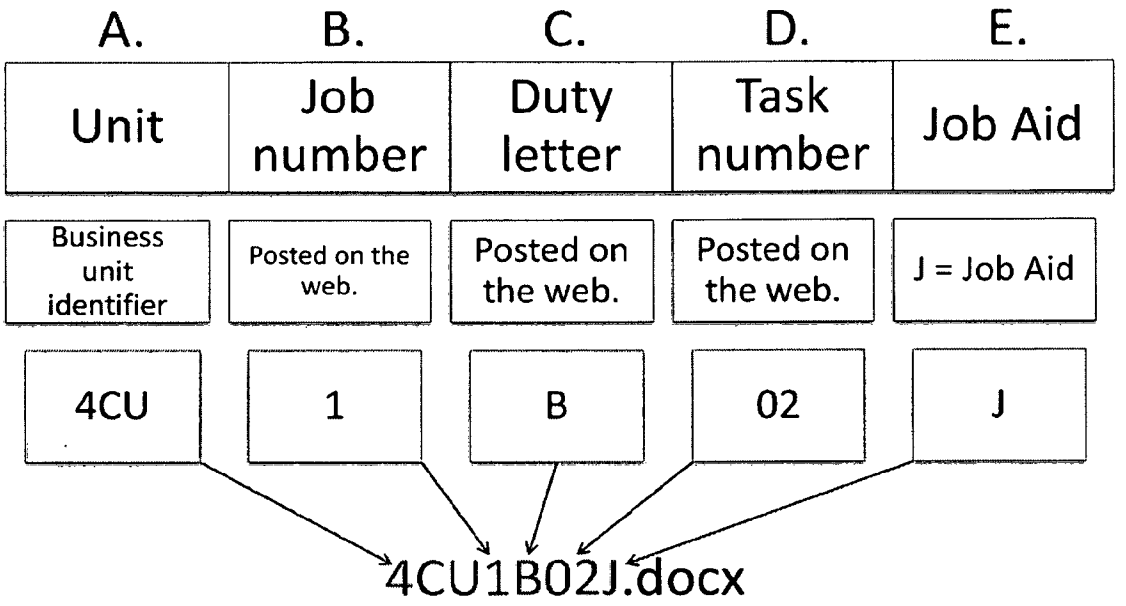


Figure 8– Job aid file names

FOOTER

- Footer information includes the revision number and date of the job aid in the lower left corner. In the lower right corner is the page number.

BODY

- Use standard MS Word conventions to create job aid content. The style settings are used for every text entry.
- Every step, sub-step, note, warning, and caution is placed in its own individual cell using the corresponding style setting.
- If you have any questions about how to correctly use the templates contact Manuals and Procedures.

Audio/Visual Information

Contact the Refinery Communications Team for more information about video production.

Using video, photographs, computer graphics, flow charts, drawings and power points all make for great job aids. *We are only limited by the software we use.*

If the Microsoft Word template is the final document published on the web then Visual aids developed using other software is inserted as a picture or object into the MS Word template.

VISIO

Visio is drawing software used to label digitized pictures and create line drawings of plant processes and equipment. Save files in appropriate format. Visio uses VSD. The VSD file is inserted as an object into the MS Word document.

PHOTOSHOP

Adobe PhotoShop™ is photo-editing software. PhotoShop is used to edit files generated by a digital camera. In general, these edits allow the clarity, resolution, and size of individual photographs to be tailored to the needs of specific job aids.

PHOTOSHOP RULES

Set photograph size using available picture software. This facilitates job aid conversion.

DO NOT resize photographs in Visio.

Recommended sizes for photographs are:

- Landscape Orientation - 3.5-inches by 2.2-inches
- Portrait Orientation - 2½-inches by 3¼-inches

PhotoShop adjusts the height of a picture when a width dimension is entered, proportionally. Conversely, it adjusts width when a height dimension is entered.

Maintain the original resolution setting of the photo. The photo quality degrades when you allow the software to proportionally reduce the resolution number when adjusting the size.

- All pictures are formatted to resolution appropriate for the intended use, i.e., printing, or web.
- Save picture files in appropriate format.
- The picture file is inserted into the MS Word document.
- Other photo/graphic applications are acceptable, such as .gif; .dwg; .jpg; .bmp; .wmf; .dib; .cgm; .htm and .png.

Contact the refinery help desk if you have questions about compatible software applications. Contact the Refinery Communications Team for more information about video production.

REVISION RECORD

Date	MOC#	Comments
1-19-2011		Added Revision Record. Converted from html to pdf

Manuals and Procedures
EOM Guidebook
Appendix M

Task Detail Interview

Developing procedures and job aids requires job knowledge for the task being performed. It is necessary to speak with subject matter experts who have years of accumulated job knowledge to complete a procedure pt job aid. Tenet 10- Involving the right people ensures the procedure, job aid, guideline, or checklist is complete. Once the right people have contributed to the document then the ABC Review process is used to validate the information.

This appendix details a formal process for the Refinery Wide Job Task Analysis that was done from 1992 to 1994 for the original EOM/EMM Project. But the guidelines for planning, setting up and completing a task analysis interview can be used for one document or for a large number of documents. The interview process presented in this appendix uses a structured and formal style; however, other less formal and even casual interviews can accomplish a task analysis interview. This appendix offers the following topics:

- Developing Task Details
- Task Analysis Interview

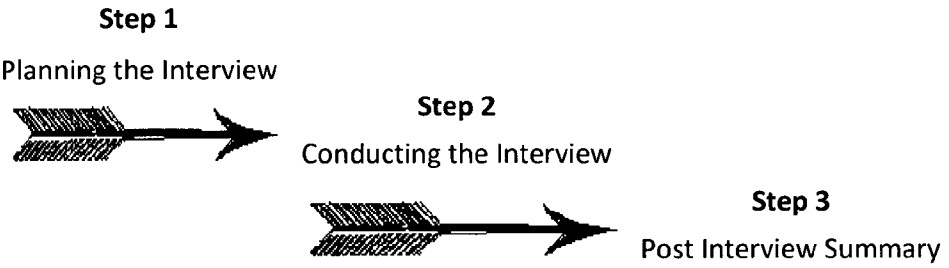
Task Analysis Interview - There are several things to accomplish during a Task Analysis Interview. These include:

- Overview of the Task Analysis Interviewing Process
- Explain the role of the subject matter expert and ask for their help
- Obtain all information necessary to define the task
- Build trust and confidence in the results of the task analysis

Task Analysis Interview

- Overview of the Process
- Explain Role of SME
- Obtain Information
- Build Trust

Steps In the Process - There are three major steps to complete an effective Task Analysis Interview. Each step must be carefully executed to achieve the objectives of the interview.



SKILLS NEEDED TO IMPLEMENT THE PROCESS - A variety of skills are needed to conduct an effective Task to Implement Analysis Interview. These include:

- Writing Questions
- Giving Clear Instructions
- Listening
- Summarizing SME Responses
- Taking Notes
- Managing the Interviewing Process
- Building Trust and Dealing with Defensive Behavior

TASK ANALYSIS INTERVIEW OVERVIEW - Before conducting a Task Analysis Interview, it is important to develop a strategy which allows you to obtain the most complete description of each task for a particular job in the least amount of time. One of the most important aspects of pre-interview planning is to write out the questions you will use during the interview. These questions need to collect the following information.

- What conditions and equipment are necessary?
- What are the exact actions performed?
- What are the results of the action?
- What are the standards of performance?

TYPES OF QUESTIONS - When planning an interview, there are four categories of questions to consider. These categories are:

1. Open or Closed Question
2. Primary or Secondary
3. Neutral or Leading
4. Fact-Finding or Feeling-Finding

A successful task analysis interview requires effective use of all of these types of questions and using each type in an appropriate manner.

Open Questions - Open questions are broad in nature. Open questions allow the respondent to provide a considerable amount of freedom in determining the amount and type of information to provide to the interviewer. Examples include:

- *What are the most important aspects of this job?*
- *How do you feel about the way the job is organized?*
- *What is the most challenging part of this job?*
- *Under what conditions would you perform these actions?*

Closed Questions - Closed ended questions are restrictive in nature. They limit the type of answer a person can give. Some closed-ended questions allow only two responses from which to choose.

- *Do you turn the control valve left or right?*
- *When you perform that operation is the switch "on" or "off?"*

Some closed questions allow the person one of several options or ask the person to volunteer a specific piece of information.
- *At what time during your shift do you take these readings?*
- *Of the three operations we discussed, which is most important?*

ADVANTAGES AND DISADVANTAGES OF OPEN QUESTIONS - Both open questions and closed questions have several advantages and disadvantages. These advantages and disadvantages need to be considered when choosing the right question for each situation.

Open Questions	
Advantages	**Disadvantages**
• Respondent does most of the talking	• Time consuming
• Reveals what is really important	• Respondent may dwell on unimportant information
• Uncovers feelings and attitudes	• Requires more note taking and good listening skills
• Allows for information to surface which may not otherwise	• Information given may be too unorganized to use

ADVANTAGES AND DISADVANTAGES OF CLOSED-END QUESTIONS - Use of closed-end questions also have several advantages and disadvantages.

Closed – End Questions	
Advantages	**Disadvantages**
• Interviewer can control the questions and answers	• May not provide enough information
• Note taking is easier	• Little or no chance to volunteer information
• Less threatening since answers do not require an explanation	• Interviewer talks more so less communication occurs
• Less skill is needed to ask these questions	• May inhibit respondent responses

Step 1: Planning the Interview

PRIMARY QUESTIONS - Primary questions are used to introduce a new topic. They can stand alone and still make sense. All of the examples used to describe open and closed questions are primary questions. Primary questions may be open questions or closed questions.
SECONDARY QUESTIONS - Secondary questions attempt to elicit more information about answers provided to primary questions asked earlier. They are usually more probing. Secondary questions are used when answers to primary questions are incomplete, superficial, or vague.

Examples:
Primary Question: *How often during a shift do you perform that operation?*
Answer: *Twice.*
Secondary Question*: Why is the second time necessary?*

Primary Question*: List the readings you take during each shift.*
Answer*: Respondent describes 12 readings.*
Secondary Question: *Is that the order you take the readings? Why?*

NEUTRAL QUESTIONS - A neutral question does not assume there is a right or preferred answer. A neutral question simply asks the respondent to provide the most appropriate answer.

LEADING QUESTIONS - A leading question suggests a particular direction or implies the most probable answer. A leading question makes it easier or more tempting for a person to answer a question in a specific manner.

Neutral Questions	Leading Questions
1. Which task is most important?	1. Responding to alarms is the most important task, isn't it?
2. What type of protection is necessary in that area of the plant?	2. You need goggles in that area, don't you?
3. How often is the shut down operation performed?	3. That shut down operation occurs only every 3 or 4 years, right?

FACT-FINDING QUESTIONS - Fact-finding questions deal with concrete facts, not opinions or feelings. Many are "closed questions" which can be answered by yes or no or have responses selected from a small number of possibilities.

Examples of Fact-Finding Questions are:
- How often do you perform this operation on this shift?
- Do all shifts perform this operation the same way?
- What specific actions do you take when the line is shut-down?
- What specific actions do you take when the line is started up again?

FEELING-FINDING QUESTIONS - Feeling-finding deals with opinions and feelings. This information is vital in completing a task analysis. Most often, feeling-finding questions are "open" (they cannot be answered by yes or no; they call for the respondent to rely on their experience and voice opinions, conclusions, convictions and sometimes hunches). Frequently the most valuable data for a task analysis comes in response to feeling-finding questions.

Examples of Feeling Finding Questions are:
- How do you feel about the way this operation is now organized?
- What suggestions would you make for improvement?
- What is your opinion of the current shut-down procedure in your area?

SELECTING THE RIGHT QUESTION - Selecting the right type of question at the right time is essential to conducting an effective task analysis interview. Several things are important including:

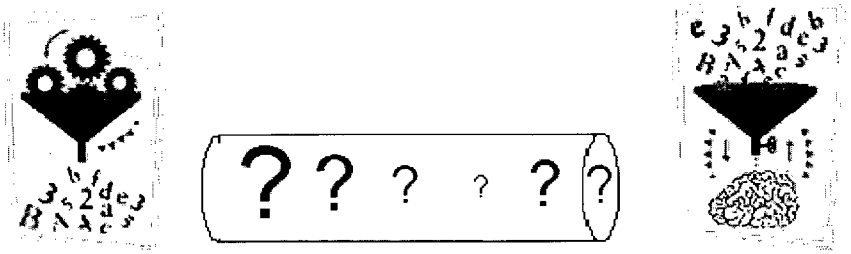
- Using appropriate language
- Ensuring questions are relevant
  Asking questions that are appropriate to the respondents' educational level, job or skill level, experience and generation
- Asking questions that are simple, direct and to the point
- The questions make sense to the respondent
- The question generates the information you need

DEVELOPING A LINE OF QUESTIONS - There are several ways in which to organize a sequence of questions, which will allow you to obtain the information you desire.

THE FUNNEL SEQUENCE - A funnel sequence of questions begins with broad open-ended questions, which lead to more specific questions. It is most appropriate in a task analysis interview because the respondents generally know the subject well and can quickly get to the specific information you need to complete the task analysis.

TUNNEL SEQUENCE - A tunnel sequence is a series of similar, related questions, which are usually all open or all, closed. This approach is useful when the interviewer needs to confirm or quantify data. The tunnel approach is most effective when grouped with other techniques such as the funnel.

INVERTED FUNNEL - An inverted funnel sequence of questions begins with a closed question and proceeds with an increasingly more open question. The inverted funnel is useful when a person needs to be encouraged to respond freely. The initial closed-ended question serves as a warm-up question for the more open-ended, risk taking questions to follow.



Step 2: Conducting the Interview

The actual interview can be divided into three distinct parts. These are:

- The Opening
- The Body
- The Closing

Each part has a specific purpose and must be conducted in a specific manner to yield the desired results. While the opening may only last a few minutes, it may be the most important part of the interview since it will set the tone for the remainder of the interview. During the opening, the interviewer must:

- Set the tone
- Establish rapport
- Explain the purpose of the interview
- Explain why the person was chosen for the interview
- Describe the interview process
- Ask for cooperation
- Provide an opportunity for questions

Steps For Conducting An Effective Opening - To open a task analysis interview, follow the process outlined below:

Opening the Interview

1. Introduce yourself and review your background
2. Review background of the Task Analysis Project
3. Describe purpose of a task analysis
4. Explain objectives of the task analysis interview
5. Describe the Task Analysis Interview
6. Discuss confidentiality
7. Ask for questions
8. Ask for support and assistance

OPENING THE INTERVIEW

STEP 1: INTRODUCE YOURSELF AND REVIEW YOUR BACKGROUND –

While introducing yourself is an easy task to perform, it is important to use the personal introductions as an opportunity to establish an appropriate tone for the interview. While it is important to communicate the importance of the interview, it is important to relax the interviewee, as well as yourself. Another part of relaxing the interviewee is to let them know who you are.

If the interviewee knows you very well, you can simply describe what your task is and a little about how you were selected and prepared for the assignment.

If the interviewee doesn't know you, he/she will want to know something more about you.
Provide a brief summary of your background including:

- Number of years with company
- Present job
- Time on present job
- Nature of current assignment
- How you were selected/prepared for this assignment

STEP 2: BACKGROUND –

An important part of the process of relaxing the interviewee is to describe the background for your task analysis. People want to know: "What's this all about?," "Why are we doing this?," and "How did we get here?" You must be able to describe the background of the project in the first few minutes of the interview.

STEP 3: PURPOSE OF THE TASK ANALYSIS –

You will next want to tell your interviewee exactly each purpose of a task analysis. Remember that a task analysis provides a complete description of the action necessary to perform a job. The information can be used to:

- Determine Standards of Performance
- Develop Objectives and Tests
- Create Effective Training Programs
- Determine Which Task Are Most Critical
- Develop or Update Procedures
- Create Tools and Job Aids

STEP 4: OBJECTIVES OF THE INTERVIEW –

Briefly describe the objectives of the interview. These include:

- Overview of the Task Analysis Interviewing Process
- Explain the role of the subject matter expert
- Obtain all information necessary to define the task
- Build trust and confidence in the results of the task analysis

STEP 5: DESCRIBE THE TASK ANALYSIS INTERVIEW –

In order for a person to assist you during the interview they must know the interview agenda. Preview your interview plan with the person to be interviewed so they know what to expect. Items to review include:

- The job duties and task to be analyzed
- Estimated duration
- Type of answers needed
- How you will record the information

- How they can best participate in the interview
- Their involvement after the interview is completed

STEP 6: ADDRESS CONFIDENTIALITY –

Sometimes people are reluctant to answer questions about their jobs if they think they are going to be quoted directly.

- Tell interviewee the data you are collecting will become part of a composite report. That is, all information gained in an individual interview will be kept confidential and anonymous. Point out that their responses will be compiled into a composite along with responses of others.

- Tell the interviewee exactly how the information they provide will be used.

Before proceeding to the body of the interview, you should pause and make sure the interviewee is comfortable, has a clear understanding of what's going on and is ready to begin giving you information. You do this by asking the interviewee the question:

"Before we go any further, do you have any questions for me?"

NOTE: If you have done a good job in:

- Describing the background of the Task Analysis
- Explaining the precise objectives of the Task Analysis, and
- Telling the interviewee a bit about yourself, and your role in the task analysis then you may not get any questions

Pause, smile, give interviewee direct eye contact. If the interviewee has no questions, move on. If the interviewee has questions, answer them before proceeding. If they ask you a question you can't answer, offer to find the answer and promise to get back to them. If the interviewee is satisfied with that, go on. If they do not seem to be satisfied, try to get an immediate answer from the appropriate person before proceeding.

STEP 7: ASK FOR QUESTIONS –

The best way to equip yourself to answer an interviewee's questions is to anticipate what they're going to ask. Put yourself in the their position. "If you were him/her, what questions would you have at this point?" Write out every question you think your interviewee might ask.

STEP 8: ASK FOR SUPPORT AND ASSISTANCE –

Transition into the body of the interview by asking for their support and assistance. If you feel comfortable with the person or if the person seems confused by your comment, provide examples of how they can best support the interview.

CONDUCTING THE BODY OF THE INTERVIEW

THE BODY –

Most of the information used in the Task Analysis Interview will be obtained and recorded during the body of the interview. Steps in the body of the interview include:

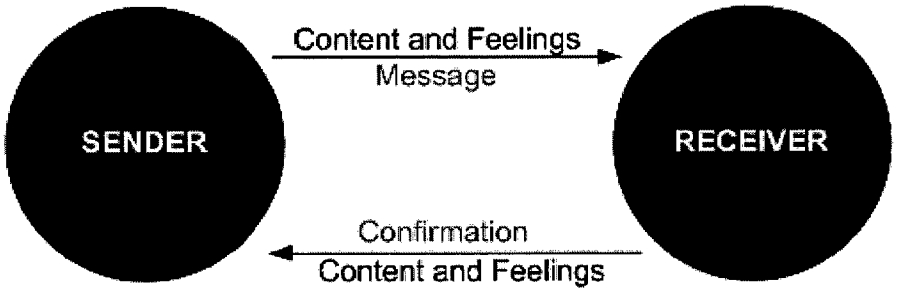
CONDUCTING THE INTERVIEW

1. Record Task and Task Number
2. Record Conditions Necessary to Perform the Job
3. Record Equipment Necessary to Perform the Job
4. Record Actions Necessary to Perform the Job and the Results Produced
5. Record Standards of Performance

The success of the interview will be based upon the interviewer's ability to:

- Manage the interview process
- Ask the right questions at the right time in an appropriate way
- Listen to the responses so that all information is heard and understood
- Record the information so that all relevant and important information is recorded

Listening - Listening is the art of hearing what has been said, understanding the key points and issues, and paraphrasing what was understood back to the sender to confirm what was said.



The goal of listening is to communicate to the sender that he/she has been heard and understood when a message was sent.

When a person sends a message, he/she is communicating both content and feelings associated with that content.

The receiver's goal is to confirm to the speaker that the message has been heard and understood in both content and feelings.

Listeners can acknowledge receipt of the message through nodding and other acknowledging gestures, as well as through confirming statements

Taking Notes - Note taking is an important skill in conducting an effective Task Analysis Interview. However, there are many challenges to overcome.

Note Taking Challenges
- Recording the correct information
- Taking notes quickly enough so as not to affect communication
- Managing the interview process while recording information
- Distracting the respondent

Note Taking Guidelines
- Ask permission before taking notes
- Explain how information is to be used
- Maintain eye contact as much as possible while taking notes
- Take notes at a consistent pace and at regular intervals so the interviewee does not believe some information is more important than other information
- Allow interviewee to see your notes so there is no concern about the information recorded
- Review notes and add missing details as soon as possible following the interview

Note Taking Principles - There are several note taking techniques which will result in more complete and useful notes following the interview.

Note Taking Techniques
- "Chunk" Information into manageable pieces or" chunks"
- Relevance Group like things together
- Labeling Name or label each chunk
- Consistency Use consistent terms, chunks and formats
- Integrate Whenever possible, use diagrams pictures, graphics tables, or drawings

Organization of Information - It is important to record the information into one of many common formats. Types of approaches to organization Include:
- Preparation information
- Procedures
- Physical layout
- Facts, specifications and rules

Closing the Interview - While brief, the closing is very important. Once the last question is answered, there may be a tendency to breathe a sigh of relief or abruptly close the interview. This may undermine the relationship you have built with the interviewee and end the interview on a down note. A well planned closing will enhance any further interviews and process being interviewed. To close the interview use these steps:

CLOSING THE INTERVIEW

- Ask Clearinghouse Question
- Record Conditions Necessary to Perform the Job
- State the Interview Has Achieved Its Purpose
- Express Appreciation

Ending the Interview - There are several things the interviewer can do to bring the interview to a successful close.

Closing Techniques

- Signal the end of the interview by asking if the interviewer has any final questions
- Asking a "clearing house" question such as "Is there anything else you can think of to add to the description of this task?."
- State that the interview has achieved its purpose by saying, "Okay, I think I now have all the information I need to complete the Task Analysis."
- Describe the next steps in the Task Analysis Process and then review what will happen to the information provided.
- Express appreciation and thank the person for their time and cooperation.

Summarizing the Results –

Once the interview is complete, it is time to summarize your results into the format agreed on by your Task Analysis Project Team. If several people are to be interviewed you will need to combine your notes into one Task Analysis Report.

EVALUATING THE INTERVIEW –

Each interview will take on its own characteristics based upon several factors including the task you are analyzing, the person being interviewed and environmental factors such as location of the interview, time of day and fatigue. After each interview, ask yourself:

- What went well with this interview? Why?
- What did not go well with this interview? Why?
- What do I want to do differently next time?

Record your evaluations so you can spot trends and take corrective action.

Using Action Verbs in Task Detail Steps –

Procedural steps should always be written using clear and appropriate action verbs. The GUIDEBOOK for the electronic operating manual provides considerable guidance on how to write good procedure steps. A stepwise numbering format is provided in the templates. An example of this format is shown below.

1. First step (e.g., "Perform lube oil check")
    1.1 First Sub-step (e.g., "Verify Trico bottles are full")
        1.1.1 Sub-sub-step (e.g., "If empty, fill them")
    1.2 Second Sub-step (e.g., "Verify no sediment in bottles")
    1.3 Third Sub-step (Etc.)
2. Second step
3. Third step (Etc.)

Action Step Format for Task Details

REVISION RECORD

Date	MOC#	Comments
1-25-2011		Converted from html to pdf.

Manuals and Procedures
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Appendix P

Procedures-Defining Our Terms

This appendix defines the terms used in the Richmond Refinery as they apply to procedures and the EOM/EMM.

Procedure	In-hand work instruction used with step-by-step sign off, including initials, time and date for each required step. Completed document retained.
Checklist	In-hand work instruction requiring check and/or initials for each step and a signature when finalized. Completed document retained.
Job Aid	Not required to have written instruction while performing the task. If written, it will be in the form of a Job Aid/Guideline, an optional tool typically used by new performers or as refresher.
EMMS	Electronic Manuals Management System is the process used to manage procedures, job aids, and checklists moving through the review cycle.

This document provides guidance and criteria for establishing when:

- A formal written step-by-step operating procedure (with signoffs) is necessary and appropriate
- Other forms of documentation are appropriate (e.g. Job Aid, Checklist, etc.)

It contains the following information:

- PSM Requirement for Procedure
- Tasks Requiring Written Procedure
- Routine Duty Tasks
- Critical Tasks
- Complex Tasks
- Tasks Not Requiring Written Procedures
- Annual PSM Certification
- User Responsibilities

PSM Requirement for step-by-step signed off procedure

At a minimum, a written step-by-step signed off procedure shall be used for each phase of operation defined by OSHA 29 CFR 1910.119; section (f) Process Safety Management of Highly Hazardous Chemicals, Operating Procedures:

a. Initial Startup (EOM Volume II, 1000 series)
b. Startup after Turnaround or Emergency Shutdown (EOM Volume II, 2000 series)
c. Shutdown (EOM Volume II, 3000 series)
d. Normal Operations (EOM Volume II, 4000 & 5000 series - see below for clarification)
e. Temporary Operations (EOM Volume II, 9000 series)
f. Emergency Shutdown (EOM Volume III)
g. Emergency Operations (EOM Volume III)

Tasks Requiring Written Procedures

A written step-by-step procedure (with signoffs) is necessary when a normal operating task scores a 7, 8, or 9 on the Criticality Index as outlined in Appendix G "Writing Operating and Maintenance Procedures for the Richmond Refinery".

Routine Duties or Tasks

Routine duties or tasks are regularly scheduled or regularly performed tasks (e.g. weekly or monthly) or work that is associated with the normal conduct of unit operations while the unit is in a stable operating mode.

Critical Tasks

Score of 3 on criticality index

a. Could result in personal injury.
b. Could result in equipment damage.
c. Could result in environmental release.

Complex Tasks

Score of 3 on criticality index

a. Composed of complex steps.
b. Requires the coordination of three or more operating personnel.
c. Requires coordination between personnel in different departments or operating areas.

Annual PSM Certification

All written, step-by-step, operating procedures require OSHA PSM annual certification.

OSHA/CalARP/PSM makes no distinction between job aids, checklists or procedures. By their definition, these are all procedures as these documents list tasks to be performed in the order listed or as otherwise directed.

User Responsibilities

Refer to Operations Procedure/Checklist sign-off Requirements.

1 Use and sign-off all applicable procedures and checklists

2 Red line procedures (job aids, or checklists) identifying changes and send red lined documents to Management Representative.

HEAD OPERATOR FIELD VERIFICATION

The Head Operator Field Verification (HOFV) is at the end of each procedure. After the procedure is used the HOFV is used to validate the document is current and accurate.

The results of the HOFV are entered into the (EMMS).

HO Field Verification Table

Position	Action	√	Initial
Head Operator			
1.	Select one of the following conditions that apply to this document:		
1a.	All portions of this document are complete and field verified as correct.		
1b.	All portions of this document were completed as applicable with exceptions noted (due to transmitter failures, step not needed, etc.).		
1c.	This document will be revised based upon field verification. The suggested revisions are noted and have been submitted for correction.		
Management Representative			
2.	This document was implemented and completed according to ABU guidelines.		

3. Field verification of this document is required.

Head Operator actions:

3.a The Head Operator completes Field Verification Table and assigns a condition.

3.b Depending on the condition do one of the following:

Condition 1a: Deliver document to Management Representative.

Condition 1b: Red line the document providing explanation for exceptions. Deliver to Management Representative.

Condition 1c: Red line the document indicating changes or updates that reflect current operating practice. Deliver to Management Representative.

4. **Management Representative actions**.

1. Ensure revisions, updates and / or changes are red lined in the document and forwarded to Area Trainer/Tech Writer for revision.
2. Ensure MOC is used to manage procedural step changes.

REVISION RECORD

Date	Reason for Change	Comments
1/31/11		Added revision record. Converted from html to pdf.
5/23/12	Guidebook audit finding updates	Updated Procedure, Checklist, and Job Aid definitions to maintain consistency with the Criticality Index definitions.
6/19/12	Guidebook audit finding updates MOC#25237	• Deleted section "Tasks Not Requiring Operating Procedures". Need for a procedure is identified when a task is scored using the Criticality Index. • Corrected section "Tasks Requiring a Written Procedure".

Chevron Richmond Refinery – Work instruction Latent Conditions Checklist

Operations and Maintenance Subject Matter Experts use this checklist to ensure written work instructions meet human factors criteria

This is a modified version of the Contra Costa Health Services (CCHS) checklist. The answers you give go into a database that contains other procedural questions that are part of the CCHS checklist. The Manual & Procedures team in the Development Department answers the other procedure-related questions in the checklist.

This checklist seeks to identify human factors issues to prevent and reduce the possibility of accidental releases of regulated substances that have the potential to cause significant harm to the public health or result in a major chemical accident or release (MCAR).

Latent Conditions Checklist

LC Item No	LC Sub	LC Category	LC Subcategory	LC Question	LC Source
1	6	Individual	Stress, Fatigue, Substance Abuse	Are emergency procedures presented in a clear, step-by-step format to reduce human error during upset situations?	
2	10	Activity Task	Procedures	Are steps written in clear, concise sentences?	5. Guide to Reducing Human Error In Process Operation, Short Version (1985)
2	11	Activity Task	Procedures	Are maintenance and operating procedures easy to use?	1 CCHS
2	12	Activity Task	Procedures	Were the procedures originally prepared by employees responsible for performing the designated tasks?	2 EQE PHA Checklist: Human Factors, developed for and used by Chevron and Tosco (1996)
2	12.1	Activity Task	Procedures	Are procedures periodically reviewed with line-management and the other employees responsible for performing the designated tasks?	2 EQE PHA Checklist: Human Factors, developed for and used by Chevron and Tosco (1996)
2	15	Activity Task	Procedures	Do the titles accurately describe the nature of the procedure?	
2	16	Activity Task	Procedures	Is there a method to track progress through a procedure, so that it can be resumed after an interruption or distraction?	4. Primatech Human Factors Checklist (1994)
2	20	Activity Task	Procedures	Is all information necessary for performing the task safely included or referenced in the procedure?	5. Guide to Reducing Human Error In Process Operation, Short Version (1985)
2	21	Activity Task	Procedures	Do Cautions, Warning, and Notes stand out from procedure steps?	5. Guide to Reducing Human Error In Process Operation, Short Version (1985)

Chevron Richmond Refinery – Work instruction Latent Conditions Checklist

2	22	Activity Task	Procedures	If more than one person is required to perform the procedure, is the person responsible for performing each step identified?	5. Guide to Reducing Human Error In Process Operation, Short Version (1985)
2	23	Activity Task	Procedures	If the procedure must be performed by someone with a special qualification, are the required technical skill levels identified?	5. Guide to Reducing Human Error In Process Operation, Short Version (1985)
2	25	Activity Task	Procedures	If the step contains more than two items, are they listed rather than buried in the text (bullets, numbering, etc.)?	5. Guide to Reducing Human Error In Process Operation, Short Version (1985)
2	26	Activity Task	Procedures	Are steps that must be performed in a fixed sequence identified as such?	5. Guide to Reducing Human Error In Process Operation, Short Version (1985)
2	27	Activity Task	Procedures	Are operating limits or specifications written in quantitative terms (i.e., "normal operating range for temperature is 200 degrees F to 250 degrees F" as opposed to "normal operating range for temperature is +/- 25 degrees F from setpoint)?	5. Guide to Reducing Human Error In Process Operation, Short Version (1985)
2	28	Activity Task	Procedures	If required, are calculations clear and easy to understand?	5. Guide to Reducing Human Error In Process Operation, Short Version (1985)
2	35	Activity Task	Procedures	Are the equipment and instrument tag numbers used in the procedures?	
2	40	Activity Task	Procedures	Are alarm setpoints documented in the EOM materials in a consistent manner? Consider Checklists, Procedures, COD tables, and Alarm lists.	2 EQE PHA Checklist: Human Factors, developed for and used by Chevron and Tosco (1996)
2	45	Activity Task	Procedures	Do procedures require verification that equipment, controls, or instruments that are deliberately disabled during operation (e.g., shutdown interlocks bypassed to allow testing) are placed back in service?	2 EQE PHA Checklist: Human Factors, developed for and used by Chevron and Tosco (1996) & RRS Engineering Human Factors Checklist (1999)

			Revision Record
Date	**Step #**	**MOC #**	**Comments**
2/26/2012			LC question were updated per 2011 Cal ARP Audit, findings #A25-03

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Appendix R

Latent Conditions Procedure Review Process used in 2004.

This appendix documents the process to meet the criteria established by RISO for performing latent condition reviews on procedures in the EOM and meeting the December 2004 deadline. It includes the process used, the terms and definitions and supporting reference material to complete the reviews.

Procedures developed after December 2004 are written and reviewed by subject matter experts trained in human factors for procedure writing. The EOM GUIDEBOOK uses human factors and details the standards used to develop procedures in the Richmond Refinery. It is the single source reference for creating procedures, training material and process & equipment descriptions.

- Appendix P - Procedures - Defining our Terms (EOM GUIDEBOOK)
- Appendix Q - Latent Conditions Checklist

Subject Matter Expert Guidelines for performing latent conditions procedure review:

1. Print out menu page's for plant EOM
2. Apply criteria and assign category for documents listed on plant EOM page. See Appendix P.
3. Identify plant wide answers to checklist questions. See Appendix Q.
4. Enter plant wide answers into database. See RISO Database. (M&P Group - O:\Development \Public)
5. Identify content changes in procedures. Apply and update document. Follow standard for updating documents in the EOM. See the following:
   - Appendix Y - EOM Content Information Management
   - Appendix Z - Electronic Document Management Process
6. Use updated templates to complete reassignment of documents identified in step 2
7. Tentatively identify emergency procedure that may be reassigned to checklists or become refinery wide documents.
8. All EOM/EMM documents require revision records:

   Exception:

   - Drawings, which require date last reviewed.

REVISION RECORD

Date	MOC#	Comments
1-31-2011		Added Revision Record. Converted from html to pdf.

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Appendix S

Re-Categorize Procedure

Procedures were re-categorized in 2004 based on operating needs. Examples are:

- Procedure to Job Aid
- Procedure to Checklist
- Procedure to Alarm Test or Alarm Response
- Procedure to Routine Duty
- Emergency Procedure to Emergency Response Checklist

Helpful tool: Re-Categorization cross-reference table.

Each time a procedure was re-categorized the following items are changed to reflect the new category:

- Filename
- Procedure Header/Title
- References to "procedure" contained within the document
- Revision Record
- Feedback loops (Head Operator Field Verification)
- Web page posting

Filename

Procedures re-categorized will keep their original filenames except when a procedure is turned into a job aid. When this happens the filename must be changed.

To change a procedure to a job aid, use the following file naming convention:

1. Delete identifier (N, A, E)

Example:

WHF **N** 5231 = delete the "N"

2. Add job aid identifier to the end.

Example:

WHF5231J = add the "J". It can be upper or lower case.

Once document has a new filename it is a new document and checked into the document management system as a new document.

Procedure Header/Title

The procedure header identifies the category to which it has been assigned. When a procedure is re-categorized this area should be changed to reflect the new category. Figure 1 displays the procedure header. Figure 2 displays changes for re-classification to a job aid.

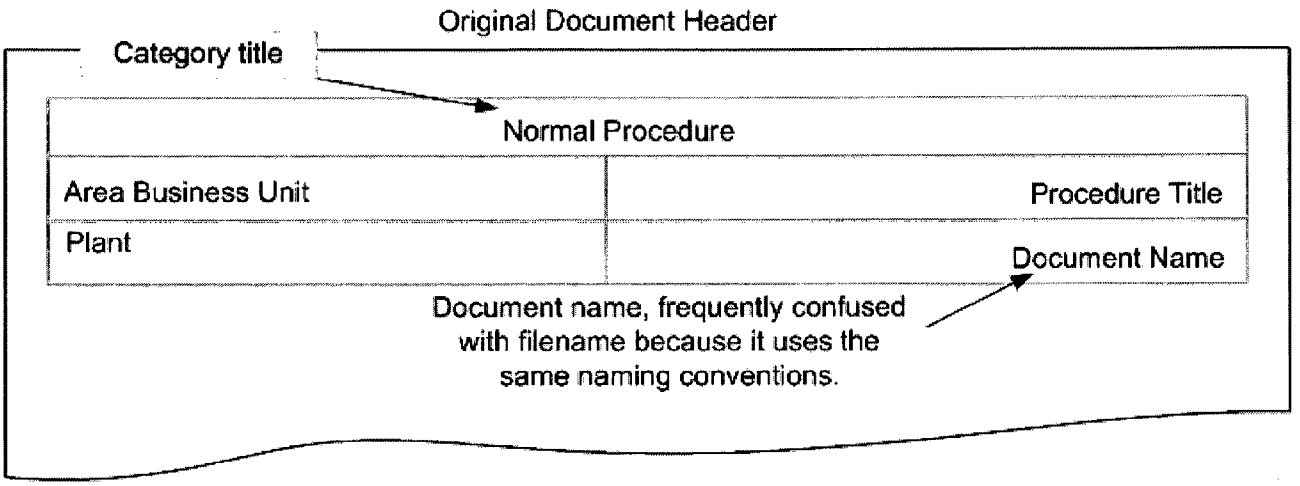

Figure 1 – Procedure Header

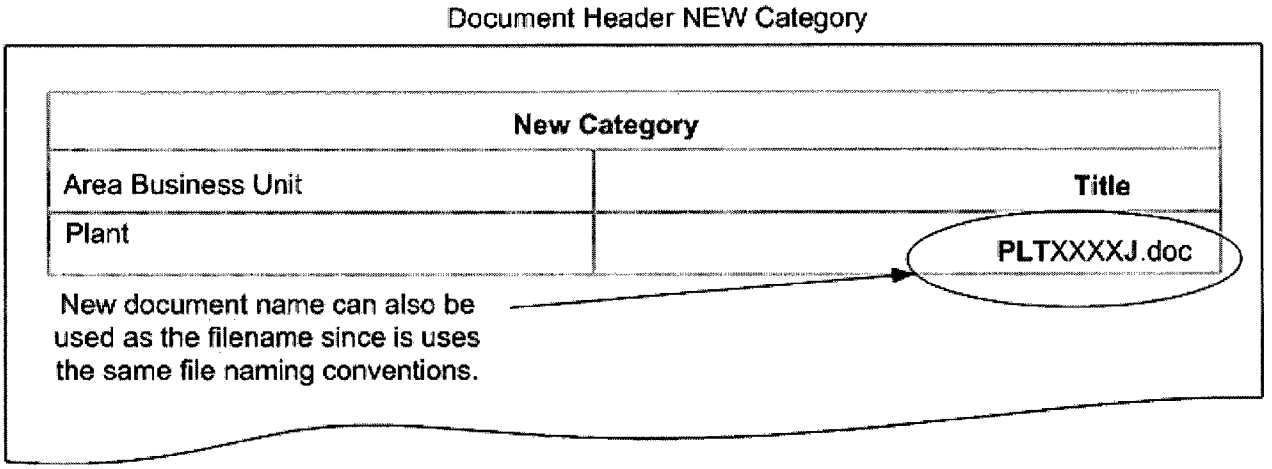

Figure 2 – Procedure re-categorized to Job Aid

References to "procedure" contained within the document

Because the procedure is developed using a template it contains references to "procedure" throughout the document. The reference points are at the following locations within the procedure:

- First Page
- Body of Procedure
- Last Page of Procedure (which is the page before the Revision Record Page)

FIRST PAGE

The first page has two reference points to change. See figure 3.

- "Procedure Title," is replaced with "**Title**".
- "**Detailed Procedure Starts Next Page**" is replaced with, **Detail **Steps** Start on Next Page**

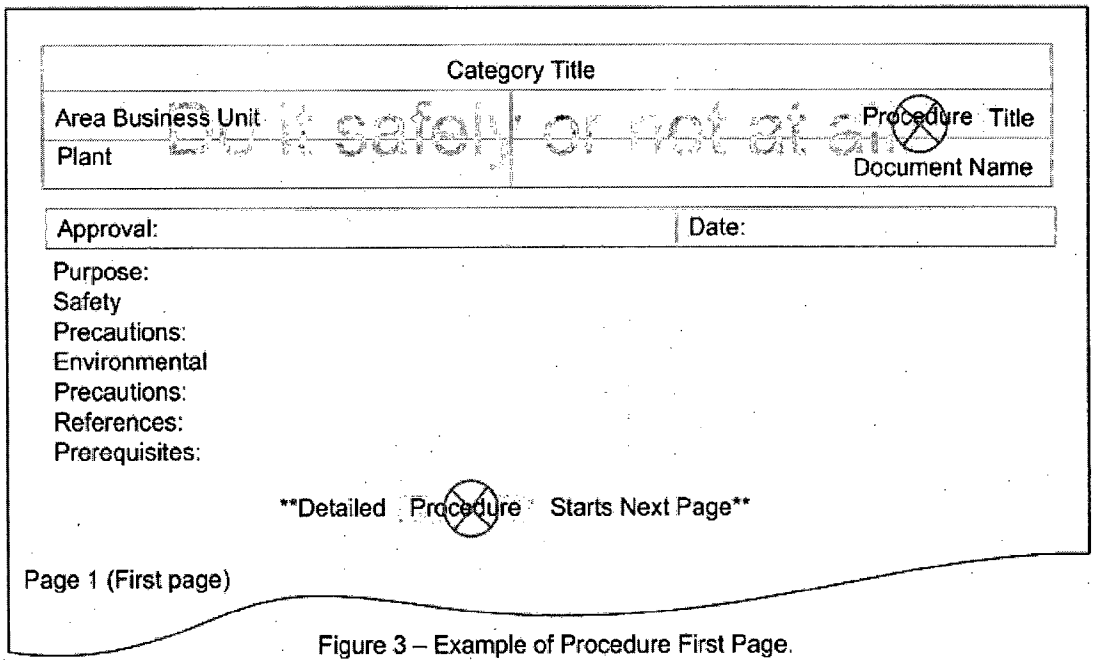

Figure 3 – Example of Procedure First Page.

BODY OF PROCEDURE

The procedure can have 3 pages or 133 pages. It has a reference point at the beginning of the detailed procedure which is usually on page 2. Replace "procedure" with "**steps**". See figure 4.

Once a procedure is re-categorized it can no longer be referred to, or referenced as, a "procedure". Perform a search to locate the word "procedure" contained within the text. Examples are phrases like:

"this procedure"
"go to step XX of this procedure"
"return to step XX in this procedure"
"use this procedure"

Replace these comments/references with the new category name to which the procedure has been assigned. For example:

Procedure Reference	Replacement Name
"this procedure" "go to step XX of this procedure" "return to step XX in this procedure" "use procedure"	Replace "procedure" with one of the following category names: · checklist · job aid · routine duty · alarm test · alarm response

If a reference in this document is a procedure then do not change it.

Examples:

1.2 Before performing this step verify start up procedure SRUN2714 has been completed and signed off.

4.7 Confirm procedure CRDN3289 is complete.

NOTICE

If a reference is re-categorized then it must be changed in all documents in which it is contained.

Steps

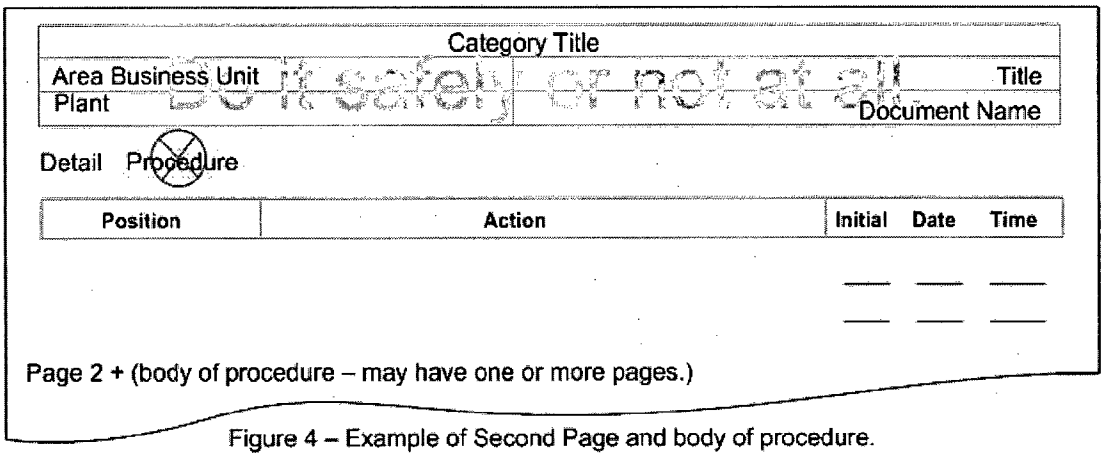

Figure 4 – Example of Second Page and body of procedure.

Last Page of Procedure

The last of the procedure contains one reference point. It is "**End of Detailed Procedure**". Replace this with, "**End of Detail Steps**. See figure 5.

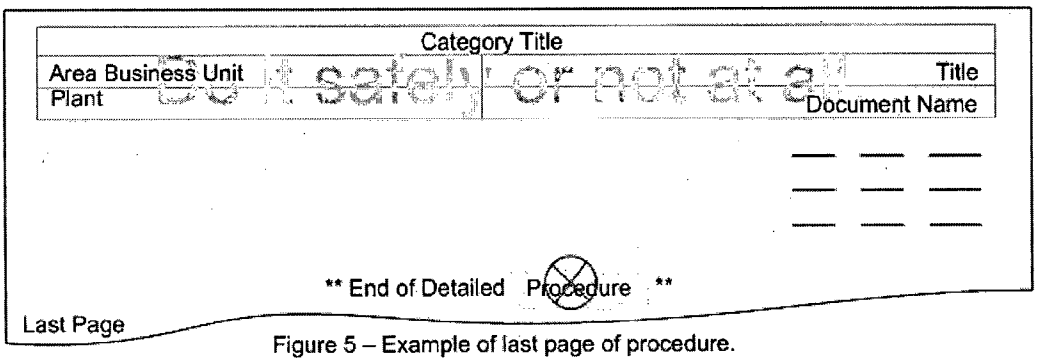

Figure 5 – Example of last page of procedure.

Revision Record

The Revision Record page of a procedure is the last page of the document. During the re-categorizing process several changes are made to address the requirements of using a revision record.

A Revision Record page is used on all documents

Revision Record

Date	Step #	MOC#	Comments
			Original Issue.

Figure 6 – Example of Revision Record.

Feedback Loops

The RISO requirements mandate that we address the following three issues:

(2-51): Is there a feedback loop in place to determine the effectiveness and understanding of the procedure.

(2-17): Does a different person subsequently make an independent check that mandates procedures have been carried out.

(2-12): Was the procedure originally prepared and periodically reviewed with line management and the employees performing the designated tasks.

The application of a formalized feedback loop (Head Operator Field Verification) at the end of each procedure incorporates a response to each of the three elements and structures our current practice associated with "red-lining" documents which require evaluation and possible changes.

The following options address this. The first is established and practiced. Because of this we can offer a more structured and formal application as an option. The second is formal and structured.

ESTABLISHED PRACTICES

RISO Question	Response
(2-51): Is there a feedback loop in place to determine the effectiveness and understanding of the procedure?	Yes, we have several: MOC, red-line, refining tenants
(2-17): Does a different person subsequently make an independent check that mandates procedures have been carried out?	Yes, each process uses a "chain of command"
(2-12): Was the procedure originally prepared and periodically reviewed with line management and the employees performing the designated tasks?	Yes, upon original conception all procedures were identified and developed as a result of Job Task Analysis. Once identified the document was developed using subject matter experts/ technical master specialists, i.e. safety engineer, process engineer, HES department, etc. Final review used the ABC review process to verify procedure steps. The MOC process uses line management/ subject matter expert input to develop written material.

FORMALIZED FEEDBACK LOOP INPUT TABLE:

The following may be added after the final detail step of a procedure, checklist, or job aid.

2004 - Formalized Feedback Loop:

Position	Validation Action	Sign / Date
AO/HO	1. Review procedure and select one of the following:	
	1.1 Procedure was used as written no changes required.	_____ / ___
	1.2 Procedure was modified due to temporary operating needs: no changes required.	_____ / ___
	1.3 Procedure was not used as written. "Red-line" document requires update.	_____ / ___
	1.4 Submitted red-lined procedure to Area Trainer for revision.	_____ / ___
Mgmt Rep.	2. Procedure was implemented and completed according to ABU guidelines.	_____ / ___

The **2004 – Formalized Feedback Loop** table was converted into the **Head Operator Field Verification Table** and made a permanent part of normal procedure content and added to templates in 2006.

HO Field Verification Table

Position	Action	√	Initial
Head Operator			
1.	Select one of the following conditions that apply to this document:		
1a.	All portions of this document are complete and field verified as correct.		
1b.	All portions of this document were completed as applicable with exceptions noted (due to transmitter failures, step not needed, etc.).		
1c.	This document will be revised based upon field verification. The suggested revisions are noted and have been submitted for correction.		
Management Representative			
2.	This document was implemented and completed according to ABU guidelines.		

2. Field verification is completed for each document requiring yearly review.

Head Operator actions:

2.a The Head Operator completes Field Verification Table and assigns a condition.

2.b Depending on the condition do one of the following:

Condition 1a:	Deliver document to Management Representative.
Condition 1b:	Red line the document providing explanation for exceptions. Deliver to Management Representative.
Condition 1c:	**Red line the document indicating changes or updates that reflect current** operating practice. Deliver to Management Representative.

3. **Management Representative actions.**

1. Ensure revisions, updates and / or changes are red lined in the document and forward to Manuals and Procedures to include in EOM. This document will be returned to your location for filing.
2. Ensure MOC is used to manage procedural step changes.

****End of Detailed Procedure****

WEB PAGE UPDATES

In 2004 the practice was to leave the document posted to its' web page location. These ensured users could still locate the document. In some cases, additional categories were added to the same web page. Examples are:

The category, "Emergency Response Checklists" may be added to the "Emergency Procedures" web page.

The category, "Checklists" may be added to any page that contains checklists associated with that category.

Additional links may be added to web pages to assist navigation. An example:

After re-categorizing a normal procedure to a job aid, a link may be added to the training material to assist the trainer in capturing relevant training documents.

TEMPORARY PROCEDURES

Temporary Procedures are routinely removed from the Normal Procedures Web Page and posted to an inactive web page after the expiration date is reached.

In the event a re-categorized procedure is moved from its web page of origin then a notice is posted indicating the new location.

REVISION RECORD

Date	MOC#	Comments
1-31-2011		Added Revision Record. Converted form html to pdf.

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Appendix T

RMPCT Controller Fundamentals

RMPCT stands for Robust Multi-variable Predictive Control Technology, a software product that is licensed and sold by Honeywell Hi-Spec Solutions.

For the complete manual select this link: RMPCT Reference Guide

RMPCT is a control package

Traditional controllers that most people are familiar with control a single variable, such as a temperature, by adjusting another single variable, such as a steam flow. Instead, RMPCT can be used to control an entire system, such as a Fractionator or a set of Distillation Columns.

Multivariable model-based predictive controller

RMPCT is a type of multivariable model-based predictive controller. It is known as multivariable because it can control multiple variables by manipulating, or moving, a number of other process variables all at the same time. For example, on a Distillation Column, RMPCT can control both the overhead and bottoms compositions by simultaneously manipulating both the reflux and reboiler steam.

Variable History

RMPCT uses models that tell it what effect one variable has on another over time. It stores a history of these effects, and is able to predict what a given variable's value will be over time in the future. Because RMPCT can predict the future, it can also calculate the best moves to make to control the unit. The models used by RMPCT come directly from real plant data during step tests. So the models are based on reality, not just an engineering model of how things 'should' work.

Optimizer

RMPCT also includes an optimizer. If all operator entered limits are satisfied, the optimizer can then drive the process to maximize profit. For example, RMPCT can maximize the unit feed rate to maximize profit.

REVISION RECORD

Date	MOC#	Comments
1-31-2011		Added Revision Record. Converted from html to pdf.

Manuals and Procedures
EOM Guidebook
Appendix Y

Data Base and EOM Information Management

Single Source Process

Background and goals

EOM Appendix A was built to fix identified problems of redundant & out of date content in the EOM. There were 50 files that were "single sourced" to one reference file used Refinery-wide. The benefits of this are:

- EOM web .pdf content is output from the database = less electronic files to manage, store & maintain.
- One link name is used by all ABU EOM pages so all ABU EOMs are automatically updated each time the new version of the .pdf is posted = reduces maintain/sustain time, much more efficient to change one document linked to 50 places than to change 50 documents linked to 50 places.
- Update & revision is done quarterly by Database Admin = manpower effectiveness/efficiency
- Email feedback from the posted document allows users to send in updates/suggestions directly to the Database Admin = manpower effectiveness/efficiency

EOM COD Database (a part of the RPM Database) was built with short & long term goals:

SHORT TERM GOAL

Short term goal is to convert all EOM COD tables into database to support long term goal-

- At a minimum, COD tables generated from the database are "equivalent" to what users have access to on the Web (ie. their COD content in a pdf file).
- During transition phase and based on manpower & resources, M&P Specialists cover their specific ABU content.
- After transition is complete, the process will be reviewed and adjustment implemented based on process input.

LONG TERM GOAL

Long term goal is to link EOM content to web viewers envisioned for use by operations (ie. OPMON, INDX etc).

RPM Database is intended to "model" CPV management & linkage with COD tables to reflect real time information offering immediate access to process units.

The business benefit based on recognizing the EOM provides the agreed on foundation information for decision-making about corrective action when processes go into deviation.

Since all Critical Process Variables are "EOM" content, EOM COD content supports decision-making around CPVs.

This document captures the current process for identifying the need to use dBase management or single sourcing. It reviews:

- Identifying the need to use a database/single source for specific information
- Current practice

Single source / database

As of this writing safety, environmental and utilization initiatives drive the need to focus the EOM to link to single source information or databases whenever possible. Whenever the number of manuals, currently 50, can be reduced to 1, this accomplishes the primary objective to maintain and sustain a "single source".

By focusing on "single source data management", the EOM is maintained/sustained in an "evergreen" status that reflects current operating practice, meets PSM standards and reduces costs.

The following processes have an impact on EOM:

- Refinery Process monitoring (RPM)
- Title V (Federal Clean Air Act)
- PSM Compliance (OSHA)
- TOP (Triangle of Prevention/Safety)
- Richmond Industrial Safety Ordinance (RISO)

REFINERY PROCESS MONITORING (RPM)

The major impact is to the Consequence of Deviation Tables, which are currently being transitioned to an Access dBase. This supports single source data management.

TITLE V (FEDERAL CLEAN AIR ACT)

The HES Web site is the definitive source for specific information. The EOM links to this source.

PSM COMPLIANCE

Consequence of Deviation Tables (COD) are updated using Management of Change Process. RPM uses COD information to reflect current practice. Level 2 Review of the MOC process shows when changes to COD are indicated in RPM. The PSM Web site is the definitive source for PSM information. The EOM links to this source.

TOP (TRIANGLE OF PREVENTION/SAFETY)

Results from TOP are incorporated into specific areas of EOM as applied to procedures.

RICHMOND INDUSTRIAL SAFETY ORDINANCE (RISO)

Uses Latent Conditions database to track information

Current Practice

Intermediate methods are used to capture data and publish to users until opportunities to single source or use databases are identified.

As we move toward becoming a world class operation we must use every opportunity to increase effectiveness and efficiency and streamline our work process. The results of this will directly impact the bottom line in cost of maintaining PSM information in real time status with immediate availability to operations.

The following lists the title of information that is captured using single sourcing (50:1) or databases (db):

FIREWATER SYSTEM EQUIPMENT LIST (50: 1)

Post Firewater System Spreadsheet equipment list in the Environmental Operating Manual

STEPS/DETAILS:

Frank Baker: place a "read-only" protected source file on a server location that we can link to the manual webpage. Frank will continue to maintain/update file info. The "right" server location for the file needs to be determined.

Create a link to the EXCEL Spreadsheet as a read-only file viewable from the Environmental Volume 1 Webpage (use a similar approach to how Cracking provides access to spreadsheets).

APPENDIX A, DEFINITION OF TERMS (50: 1)

- Post Appendix A, Definition of Terms, to all plant manuals
- Locate in Volume I
- Perform quarterly review to add plant specific terms as discovered
- Maintained by Manuals and Procedures

GENERIC CHAPTER INFORMATION (50: 1)

Volume 1, Chapter 1 rewrite is generic. Post all plants to this document. (50:1)

Volume 1, Chapter 2 integrates non-generic information not retained in Chapter 1.

This non-generic information is:

- Purpose of Plant
- History of Upgrades and Modifications
- General Nomenclature

Purpose of Plant

This information is in the introduction of Chapter 2.

History of Upgrades and Modifications

Section numbering for Chapter 2 starts with identifier 2.1.

Insert section 2.0 before section 2.1

Style: **Sect Title**

Insert text for *History of Upgrades and Modifications* below section 2.0 and style: Sect Text.

Protocol for 50:1

1. Copy out documents to be eliminated/archived from document library (Chpt. 1)
2. Check out documents for use from document library (Chpt. 2) or create singe source document.
3. Copy info from step 1 to step 2
4. Establish single source document and identify who owns it and where it should reside.
5. Check In documents identified in step 2 (with changes). (Chpt.2s)
6. Archive or eliminate documents identified in step 1. (Chpt. 1s)

How to manage/maintain Refinery Wide Documents (RWDs):

1. Verify documents are Refinery Wide.
2. Link to REFINERY WIDE DOCs (RWDs) from EOM ABU page (not plant page).
3. EXAMPLE: List as GAS TECH procedure not REFINERY WIDE document.
4. Replace REFINERY WIDE DOCs with a link in all plant manuals that reference them. Users look where they expect to find them.
5. Collect RWDs in R-drive on htm page.
6. Manuals and Procedures own security/management/format of RWDs. Specific expertise owns content.

IRC and RMPCT Information

Managing IRC and RMPCT information in the EOM is necessary to address the following:

- Operator Training
- CBO reference
- Partner resource
- PSM compliance

IRC summaries are in the text of Chapter 5 associated with relevant equipment or placed in the process information). It includes the following:

- Purpose
- How the IRC Work
- Limit logic
- Operator actions

RMPCT information is in a separate section of Chapter 5. It includes:

- Purpose
- Link to matrices
- Variables (three types)

Basic information is in the CHAMP Manuals. Changes are MOC driven and owned by CST.

GAS TECH INFORMATION

The following table summarizes the type of content, the file types, and file locations for the refinery wide gas tech information:

The file naming convention for ABU job aids described in the guidebook is: org + unique identifier + j.

The two refinery-wide Gastec job aid filenames use "RIC" as the org prefix and a unique identifier, but do not have the j.

Gas Tech EOM File Name/Location

Content Owner = Plant Protection	In PANAGON	R: Drive	Web links http://www.ric841.chevrontexaco.net/eom/Refinerywide-EOM/
Gastech Training	no	Yes- ppt	...\Rgastech.ppt
GT402 Job Aid (ricg402)	Yes-doc	Yes-pdf	...\ricg402.pdf
GT3220 Job Aid (ricg3220)	Yes-doc	Yes-pdf	...\ricg3220.pdf
Verification of Calibration Log (gtvlog)	Yes-doc	Yes-pdf	..\gtvlog.pdf
Repair Log (gtrlog)	Yes-doc	Yes-pdf	...\gtrlog.pdf

In cases where EOM chapters are not established, General Nomenclature can reside at the beginning of Chapter two with the identifier of 2.1a. This is temporary until the information is converted to EOM format.

11-06-03: For refinery wide documents that have unique identifiers, guidebook file naming conventions are not critical. The objective is to ensure that each document has a unique file name that is not used by another document. Naming documents is like naming people. The name, 'John' is very common. But the last name is a 'unique identifier' that establishes identity not shared with others.

REVISION RECORD

Date	MOC#	Comments
1-31-2011		Added Revision Record. Converted from html to pdf

Manuals and Procedures
EOM Guidebook
Appendix W

EOM Web Page Lay Out

The EOM web page for each business unit is commonly called 'the grid' which enables navigation to all parts of the EOM in an effective and efficient way. It consists of a table grid showing the location of specific categories within the EOM. Each cell in the grid uses links to access a specific category.

- Active links are shown as **X** and are active (blue/underlined)
- Inactive links are shown as **X** (black/no underline). Inactive links can be used as placeholders for information available within a week or two.
- Gray shaded areas indicate no information available.

Figure 1 shows the grid. This layout and format is used for each business unit

EOM -Cracking

The items beneath the blue header in the following table are managed by the Manuals & Procedures Group.
All other items are managed by the content owners listed on the associated web pages.

Plant Name	Vol 1		Vol 2			Impact/Temp/Archived	Vol 3	Vol 4	Other		
	Process Descrip	COD Table	Alarms	Normal Operations	Routine Duties	Obtain approval before use.	Emergency Operations	Training/ Job Aids	Lab/SOPs	P&IDs	Best Practice
Alky	X	X	X	X	X	X	X	X	X	X	X
AlkyGru-SHU	X	X	X	X	X	X	X	X	X	X	
Butamer	X	X	X	X	X	X	X	X		X	
CACG	X	X	X	X	X		X	X	X	X	
FCC	X	X	X	X	X	X	X	X	X	X	X
*North GRU	X	X	X	X	X		X	X	X	X	
*South GRU	X	X	X	X	X		X	X	X	X	
*Reactor	X	X	X	X	X		X	X	X	X	
*Utilities	X	X	X	X	X		X	X	X	X	
LPG-NH3 Racks	X	X	X	X	X	X	X	X	X	X	
Poly	X	X	X	X	X	X	X	X	X	X	
SRU	X	X	X	X	X	X	X	X	X	X	X
Yard DIB	X	X	X	X	X	X	X	X	X	X	

Figure 1 – EOM Grid

The EOM consists of four volumes. Each volume contains specific categories for that volume. These are:

Volume 1	Volume 2	Volume 3	Volume 4
- Process & Equipment Description - COD Tables	- Alarm Procedures - Normal Procedures - Routine Duties -Checklists	- Emergency Procedures	- Training Material - Job Aids - IQ Guides

Figure 2 shows the EOM Content and non-EOM Content.

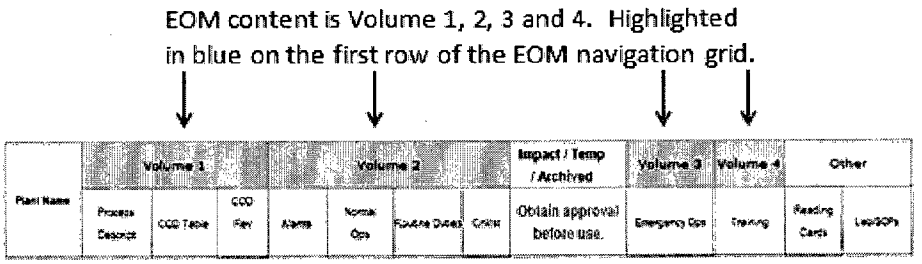

Figure 2 –Grid Header

The top row of the grid is highlighted in light blue. This identifies the EOM. Information listed in the column below the light blue highlight is EOM content.

- Each plant within the business unit is listed on the left side of the table grid.
- Each row represents the operating manual for that plant.

Other information such as lab sops, ISO9000, P&IDs, reading cards are not specific to the EOM.

The links are placed under the "Other" category as a convenience to end users. These documents are controlled by other sources and are not managed by Manuals & Procedures and are not part of the EOM.

Each active link listed in the category directs the user to specific procedures or information for that category.

Below the grid

There are three columns shown below the grid. These are:

- ABU Specific Information
- Health, Safety & Environmental
- Other Information

Content listed below the grid does not belong to the EOM. Figure 3 shows below the grid content.

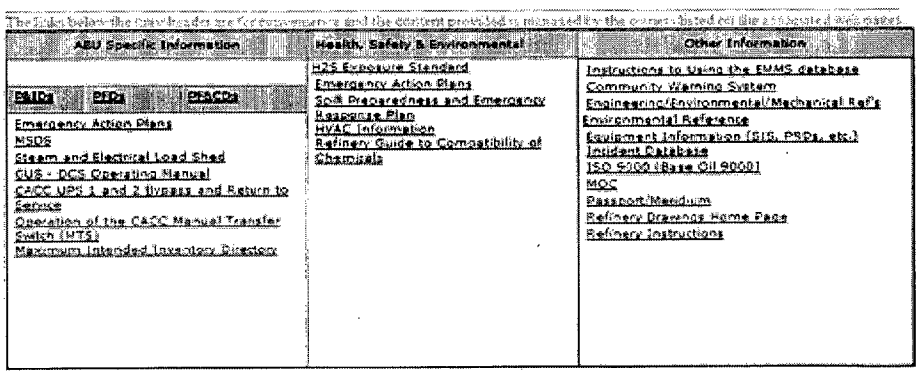

Figure 3 –Below the Grid

The bottom of the EOM web page is the footer. Figure 4 shows the footer. The technical contact and content owner is the Manuals & Procedures Specialist assigned to the business unit. Any Manuals & Procedures Specialist can assist a business unit. The e-mail link is for the convenience of the end user.

Figure 4 –Footer

What are the boundaries?

Frequently end users believe that if information is posted on the web page then the information belongs to the EOM. This is not the case. The EOM web pages evolved slowly and as time went on more and more information was added to the web page as a convenience so end users wouldn't have to hunt around for information. Now, the Refinery intra-net is much more organized and up to date with added functionality and navigation tools.

With the advent of PSM and state, federal, and local ordinances that require information be maintained in an 'evergreen' status, it became apparent that the web page needed to show the visual boundaries that identified EOM information from the rest of the refinery. The owners of the information for intranet web pages are listed in the footer. The owners are responsible to maintain their information.

Who owns what?

For the EOM, Manuals & Procedures owns the design, layout, organization, structure and format for the EOM web pages. Manuals & Procedures manages the information for the business units.

The business units own the information and their subject matter experts provide authority and guidance to the Manuals and Procedures Group. The Management of Change process is used to make changes to operating procedures / and operating information within the EOM.

EOM System for Special Procedures:

Once an EOM document is assigned a filename it is posted to a permanent place within the EOM. The exception to this is the Temporary Procedure category (9000 Series) or IMPACT Procedures used for Shutdowns. These require special handling because they have an expiration date. Other procedures within the EOM do not.

WHAT WE DISCOVERED

During shutdowns business units (and IMPACT Teams) would create independent procedures that would never be sent to the M&P group for file naming, human factoring, compliant formatting, and posting. They would be kept inside the business unit with no standard process of storing or archiving. When the next shutdown would occur many of the procedures would be recreated because they were not put in the EOM.

As OSHA regulations apply to all procedural documents (any document giving instruction or guidance on how to do a task) keeping these documents out of the EOM does not exclude them from the document requirements of OSHA. Therefore, the correct location for these "special procedures" is in the EOM.

Managing 9000 Series Procedures – (Special Procedures)

Managing 9000 Series Procedures is one of the few times procedures are moved from one web page to another. This meets two basic requirements:

1. It removes in-active, out of date procedures from the active web page by identifying the document as expired as well as removing the document to a web page that is specifically designed for this purpose.

2. It makes the ***historical content*** available to end users who can read and research what was done previously. Some of the content can be re-used at a future date, in different procedures. By making the information accessible the end users can educate themselves.

Special Procedures Expired

Once a procedure has expired it is moved to The "Past Impact and Expired Temporary Procedures" web page located between Vol. 3 and Vol. 4 on the EOM grid page under Impact/Temp/Archived for each plant on the business unit web page.

EOM -Cracking

The items beneath the blue header in the following table are managed by the Manuals & Procedures Group.
All other items are managed by the content owners listed on the associated web pages.

Plant Name	Vol 1		Vol 2			Impact/Temp/Archived	Vol 3	Vol 4	Other		
	Process Descrip	COD Table	Alarms	Normal Operations	Routine Duties	Obtain approval before use.	Emergency Operations	Training/ Job Aids	Lab/SOPs	P&IDs	Best Practice
Alky	X	X	X	X	X	X	X	X	X	X	X

The documents listed on this page serve as historical reference documents only. These documents are not "maintained as current and accurate" as once they expire they are not part of active EOM documents. An MOC is required to reactivate the document once it has expired. This enables end users to refer to the content at their convenience.

Figure 11 shows an example of the Past Impact and Expired Temporary Procedures web page.

ALKY Plant

Past Impact and Expired Temporary Procedures- (Volume II)

Procedures must be reactivated via the MOC process prior to use.

Once the Impact event is complete and documents expire these procedures become reference documents only, procedures must be reactivated via the MOC process prior to use.

Past Impact Shutdown Events

Temporary 2010 Shut Down Procedures	
9140	Hydrocarbon Free Deisobutanizer Section

Expired Temporary Procedures

9030	Hydro Blast V-1481 Suction Line
9035	Alky Posture For FCC E-192A/B work
9036	Return From Alky Posture For E-192A/B

Figure 11– Example of "Past Impact and Expired Temporary Procedures – (Volume II)

REVISION RECORD

Date	MOC#	Comments
1-12-2011		Added revision record. Converted from .html to .pdf.

Manuals and Procedures
EOM Guidebook
Revision Record

Date	Step #	MOC#	Comments
4-18-2002			Original Issue Richmond Refinery. Revision Record created for EOM GUIDEBOOK Chapters and Appendices.
6-11-02	-	N/A	**Appendix K**, File Naming Conventions. Non-MOC change. No rev. record required.
			Removed technical editors from paragraph one.
			Added **File Naming Conventions for Refinery Wide Documents** 1. SAROS filenames and EOM Document Names • 1st 3 letters will be "RIC" followed by standard format used in SAROS & EOM 2. Folders in SAROS and Web: A separate folder for Refinery docs will be set up in both SAROS & for Web. Each ABU EOM webpage will link to single source file in the Refinery document folder
6-11-02	-	N/A	**Appendix Z**, Electronic Document Management Process. Non-MOC change. No rev. record required.
			Removed **Technical Editors** from sub-section 1. Technical Editors do not give permission or approve document requests.
10-10-02	-	N/A	**Appendix Z**, Electronic Document Management Process. Non-MOC change. No rev. record required.
			Application upgrade from Saros to Panagon
			Replaced Maintain/Sustain Team to Manuals and Procedures Specialist(s).
11-14-02		NA	Chpt.1 – added Appendix Y & Z to list. Non-MOC change. No rev. record required.
			Chpt.2 - Table 2.3 – f1ii – Operating Limits – added Refinery Process Monitoring and indicated elements captured. Currently unable to complete formatting due to technical difficulties with Gil2 conversion. Will follow at later date. See "tracking changes in MS Word"
			Appendix G – Writing Operating Procedures for the EOM Use Human Factors Checklist – Appendix Q
1-10-03			**Appendix Q –** Human Factors Checklist - The Human Factors checklist serves as a guidance document that ensures operating procedures use human factors and meet the Richmond Industrial Safety Ordinance requirements.
1-28-03			**Appendix K –** Use PQD Qualification Codes as file naming conventions for Break In Checklists, Situationals, Solo Oral & Written Tests, and Panel Oral & Written Tests.
3-5-2003			**Chapter 5 -** **History of Upgrades/Modifications to the Unit** moved from Chapter 1 of plant manuals to Chapter 2. Chpt. 1 is generic and all plant manuals link to the generic information described in the GUIDEBOOK.
6-27-2003			**Appendix H –** Entered guidance information re; Approval/Date Bar, Hanging Header information, & Detail Sign Offs.
			Appendix J – Entered guidance information re: First page immediate actions continue to right column in red if no stabilizing actions are required.
8-27-03			**Appendix Z -** Revision record number advances each time the document is published with changes. This change is automatic and controlled by the document library application. Database Updates/revisions (current practice). Included revision record/footer for COD tables.
			Appendix I – Under **Organizing and Drafting Procedures** Added, See **Appendix G – Writing Operating Procedures for the EOM** for details.
			Appendix G Added : Detail Step Signoff – Section Title Sign off at the level that states the actual steps performed to carry out a task. Included Figure 1 and Figure 2 examples.
			Appendix Y Added, **Data Base Management / Single Sourcing Process-** Background and goals
			Appendix Q Replaced with City of Richmond Latent Conditions Checklist.

Date	Step #	MOC#	Comments
			Appendix L Job aids use revision records to document when changes have been made to the instructions. This helps the users determine if they have the most current training document.
11-06-2003			**Appendix Y** Added GAS TECH EOM information re: format/file naming/location
3-16-04	7.2		**Appendix J** Removed "capitalized" Action verbs are **Bolded.** Instead of , 'Action verbs are capitalized and **Bolded.**'
May-2005	All		Updated to reflect new corporate image (web standard).
8-12-2005		13166	**Appendix-S** Re-categorized Procedures Procedures may be re-categorized based on operating needs.
8-28-2006	-	14594	**Appendix-T** RMPCT Controller Fundamentals Added brief description of RMPCT and link to RMPCT manual.
10-19-2006	All	CalARP	**Appendix – AA** Added to document and define compliance solutions for audit findings.
12-13-2007		17773	**Appendix – W** Added this appendix to define the EOM web standard. This was identified as a critical area to meet the requirement for APR. RI-370, Step 3.5 requires an MOC to change the EOM Guidebook.
6-24-2008		18450	**Appendix – K** Added file naming convention to include Exapilot procedures.
1-31-2011	All		Added revision records to each appendix and converted from html to pdf.